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SUGGESTIONS

REGARDING

FOREST ADMINISTRATION

IN THE

HYDERABAD ASSIGNED DISTRICTS.

BY

D. BRANDIS, F.R.S.,

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Dated 1st November 1878.

CALCUTTA:

OFFICE OF THE SUPERINTENDENT OF GOVERNMENT PRINTING.

1879.

634.9
B 818 H

CALCUTTA:
PRINTED BY THE SUPERINTENDENT OF GOVERNMENT PRINTING,
8, HASTINGS STREET.

3778

CONTENTS.

PAGE.

1. Introduction 1

CHAPTER I.

GENERAL.

2. History 1
3. Areas . . . . . *ib.*
4. Time favourable for settling definitely the forest area which may be reserved 2
5. Formation of divisions . . . . . *ib.*
6. Divisional officers as a rule to have charge only of demarcated reserves 3
7. Relations between district and forest officers. Control of protected forests . . . . . *ib.*
8. Increase in the present superior establishment necessary . . . . . *ib.*
9. Financial results of Forest Administration in Berar 4

CHAPTER II.

THE MELGHAT.

10. Gawilgarh range—Importance of the forest lands on the Gawilgarh range 4
11. Configuration of the Melghát hills . . . . . *ib.*
12. Feeders of the Tapti river 5
13. Rock . . . . . *ib.*
14. Character of forest. Salei 6
15. Teak . . . . . *ib.*
16. Bamboo . . . . . *ib.*
17. Tinus . . . . . *ib.*
18. Bijasál, blackwood, khair . . . . . *ib.*
19. Anjan . . . . . *ib.*
20. Other trees 7
21. The Melghát forests under the control of Government. Rights of Melghát Rajahs . . . . *ib.*
22. Privileges exercised by the villages . . . . . *ib.*
23. Right to levy dues leased until 1868 . . . . . *ib.*
24. From 1868 dues were levied by Government . . . . . *ib.*
25. Establishment of a system of weekly bazars . . . . . *ib.*
26. Grazing dues 8
27. Bairagarh reserve Forest requirements of resident population . . . . . *ib.*
28. Working of forests not included within the reserve from 1872 to 1876 . . . . . *ib.*
29. Formation of district (Gugumal), reserve in 1876 . . . . . *ib.*
30. Unreserved or 'Protected' forests 9
31. Quantity of forest produce exported into Berar from the Melghát . . . . . *ib.*
32. Suggestions regarding management . . . . . *ib.*
33. Protected forests . . . . . *ib.*
34. Reserved forests—their area 10
35. Supply of forest produce and revenue of the Melghát forests . . . . . *ib.*
36. Provision for the villages at present in the (Gugumal) reserve 11
37. Villages in the Bairagarh reserve—red soil and black soil villages . . . . . *ib.*
„ Black soil villages to be retained . . . . . *ib.*
38. Red soil villages—their disposal 12

PAGE.

39. Effect of these proposals on the supply to the plains of Berar through the nakas 12
40. Cutting by rotation in Gugumal reserve to be stopped 13
41. Demarcation of the boundaries of the Bairagarh reserve . . . . . ib.
42. Boundaries of the Gugumal reserve . . . . . ib.
43. Maps of the Melghát reserves 14
44. Roads . . . . . ib.
45. New road from Ellichpur to Pili . . . . . ib.
46. Other roads in the Bairagarh reserve . . . . . ib.
47. Fire protection in the Gugumal reserve . . . . . ib.
48. Fire protection in the Bairagarh reserve 15
49. Division of the Bairagarh reserve into blocks . . . . . ib.
50. Former number of blocks too numerous; the eight now proposed more convenient . . . 16
51. Teak plantation in the Bairagarh reserve . . . . . ib.
„ First system. Cultivation by transplants . . . . . ib.
52. Causes of the slow growth in the Saoli Karita plantation 17
53. Plantation near Pili . . . . . ib.
54. Areas planted under the first system . . . . . ib.
55. Second system. 'Notch' system . . . . . ib.
56. Total results of plantations . . . . . ib.
57. Sowings at Sembado . . . . . ib.
58. Kolkaz nurseries 18
59. Chief enemies of plantations in the Melghát . . . . . ib.
60. Means of preventing damage by rats—Captain Doveton's system . . . . . ib.
61. Supply of teak seed . . . . . ib.
62. Record of all details in the plantation journal 19
63. Eucalyptus at Kolkaz . . . . . ib.
64. Bamboos at Kolkaz . . . . . ib.
65. Cultivation of the 'Katang' bamboo . . . . . ib.
66. Plantations of other species of tree . . . . . ib.
67. Forest garden at Kolkaz . . . . . ib.
68. Cutting of creepers 20
69. Thinning-out of irregularly-shaped teak trees . . . . . ib.
70. Cutting of bamboos 21
71. Cutting of other species than teak . . . . . ib.
72. Revenue and expenditure of the Melghát forests . . . . . ib.
73. Expenditure of the reserves 22
74. Establishments of the reserves 23
75. No reduction in the establishment, owing to changes in the reserves, possible . . . . ib.
76. Financial prospects of the Melghát forests . . . . . ib.

CHAPTER III.

RESERVES OF BASIM AND BULDANA.

KINWAT RESERVE.

77. Situation 23
78. Boundaries 24
79. Area . . . . . ib.
80. Villages . . . . . ib.
81. Maps . . . . . ib.
82. Rock and soil . . . . . ib.
83. Valleys and plateaux . . . . . ib.
84. Traces of old cultivation 25
85. Description of forest growth . . . . . ib.
86. Teak . . . . . ib.
87. Tewas, bija sál, and bamboos . . . . . ib.
88. Fire protection . . . . . ib.
89. Probable effect of fire protection 26
90. Cultivation of teak proposed . . . . . ib.
91. Procedure proposed . . . . . ib.
92. Area to be planted 27
93. Sub-division of reserve into blocks . . . . . ib.
94. Sub-division lines to follow the main export lines 28

PAGE.

95. The old village areas cannot be formed into blocks 28
„ The blocks cannot be formed so as to correspond with difference of soil and forest growth . . *ib.*
96. Revenue realised 29
97. Expenditure . . . . . *ib.*

PENGANGA RESERVE.

98. Inspection—demarcation 29
99. Villages . . . . . *ib.*
100. Maps 30
101. Boundaries . . . . . *ib.*
102 Topographical features . . . . . *ib.*
103. Chief valleys . . . . . *ib.*
104. Forest on plateaux . . . . . *ib.*
105. Forest on slopes and in ravines. 31
106. Forest in valleys . . . . . *ib.*
107. Protection from fire . . . . . *ib.*
108. Future sources of revenue . . . . . *ib.*
109. Blocks 32
110. Sub-divisional lines should be so selected as to serve as export lines . . . . . *ib.*
111. Grazing of Panala village . . . . . *ib.*
112. Grazing of Marwari village . . . . . *ib.*
113. Financial results . . . . . *ib.*
114. Financial prospects 33

GHÁTBORI RESERVE.

115. Area 33
116. Maps and boundaries . . . . . *ib.*
117. Character of forest . . . . . *ib.*
118. Protection from fire and pasture 34
119. Appearance of the grass—cattle pounded . . . . . *ib.*
120. Protection must be made more efficient . . . . . *ib.*
121. Management 35
122. Blocks and sub-divisional lines . . . . . *ib.*
123. Revenue . . . . . *ib.*
124. Expenditure . . . . . *ib.*
125. Establishment . . . . . *ib.*
126. Suggestions . . . . . *ib.*

GARU—MATTERGAON RESERVE

127. Inspection—situation 36
128. Boundaries . . . . . *ib.*
129. Area . . . . . *ib.*
130. Maps 37
131. Table lands and plateaux . . . . . *ib.*
132. Level ground within the reserve . . . . . *ib.*
133. Rock and soil 38
134. Water-supply in the reserve . . . . . *ib.*
135. Character of forest . . . . . *ib.*
136. Growth of anjan in the forest . . . . . *ib.*
137. Other trees . . . . . *ib.*
138. Grass grazed down by cattle 39
139. Protection from fire . . . . . *ib.*
140. Young growth of anjan . . . . . *ib.*
141. Cultivation of anjan not proposed at present . . . . . *ib.*
142. Protection against grazing . . . . . *ib.*
143. Cattle pounded in 1876 40
144. Rectification of boundary proposed . . . . . *ib.*
145. Chief sub-divisional lines . . . . . *ib.*
146. Old cart roads 41
147. Revenue and expenditure . . . . . *ib.*
148. Future expenditure . . . . . *ib.*
149. Distribution of the local establishment . . . . . *ib.*

PAGE.

CHAPTER IV.

ON PROTECTED FORESTS AND DISTRICT RESERVES.

150. Introduction 42
151. Cutting of wood—Reserved trees . . . . . *ib.*
152. Grazing . . . . . *ib.*
153. Cultivation 42
154. District reserves . . . . . *ib.*
155. Raygaon district reserve 43
156. Demarcation . . . . . *ib.*
157. Cutting of wood prohibited—grazing permitted . . . . . *ib.*
158 Inspection—effects of too much grazing . . . . . *ib.*
159. Growth and reproduction . . . . . *ib.*
160. Area of district reserves in Básim district 44
161. District reserves in Buldána . . . . . *ib.*
162. Lonar forests . . . . . *ib.*
163. District reserves in Wún . . . . . *ib.*
164. Kelapur reserve . . . . . *ib.*
165. Protected forests in the Amráoti district 45
166. Forests of the Amráoti hills . . . . . *ib.*
167. Division into blocks for revenue purposes . . . . . *ib.*
168. Revenue of the Amráoti hills—forests and privileges of villagers in the removal of forest produce therefrom . . . . . *ib.*
169. Necessity for preserving a portion of the hills as forest, and the selection of the area to be preserved . . . . . *ib.*
170. The block furthest from Amráoti to be entirely closed 46
171. Grass preserves to be formed near Amráoti . . . . . *ib.*
172. Remaining area to be left open for grazing—control of fuel-cutting . . . . . *ib.*
173. Three great sub-divisions thus formed . . . . . *ib.*
174. Forests on the Karanja hills . . . . . *ib.*
175. Babul buns in the Amráoti district 47
176. Babul buns in the Ellichpur district . . . . . *ib.*
177. Babul buns in the Akola district . . . . . *ib.*
178. Selection of babul buns in the Pūrna valley for reservation . . . . . *ib.*

STATEMENTS.

A. Receipts and charges of the forests in the Hyderabad Assigned Districts from 1874-75 to 1877-78. 49
B. Forest revenue of the Hyderabad Assigned Districts from 1871-72 to 1877-78 50
C. Revenue and expenditure of the Bairagarh reserve (Melghát) for seven years, *viz.*, from 1871-72 to 1877-78 . . . . . *ib.*
D. Revenue of the Melghát forests for twelve years, *viz.*, from 1866-67 to 1877-78 51
E. Revenue realised from the Melghát unreserved forests at the different nakas or revenue stations . 52
F. Total number of teak trees cut in the Bairagarh reserve south of the Sipna from 1871-72 to 1876-77 *ib.*

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Inspector-General of Forests to the Government of India.

Dated 1st November 1878.

INTRODUCTION.

The following remarks and suggestions are the result of a tour of inspection made through the forests of the Hyderabad Assigned Districts in 1877. Marching across a portion of the Nizam's Dominions from the Ahiri forests in the Chanda district of the Central Provinces, I entered the Básim district of Berar on the 20th February, and left the province on the Tapti river on the 19th March, after examining the forests in the Básim, Buldána, Akola, and Ellichpur districts.

CHAPTER I.

GENERAL.

History.

2. Berar was placed under British Administration in 1853. The Revenue survey was commenced in 1861, and is almost complete. It has not yet, however, been extended into the wild country of the Melghát. The Forest Department was organised in 1866. Until 1869 Forest Administration in Berar was under the Conservator of Forests in the Central Provinces, the forests being in charge of the civil officers, and those of the Melghát under Captain Mackenzie, who was Assistant Commissioner at Ellichpur. In 1869 the forests were placed under a separate officer styled Deputy Conservator, which appointment was held by Mr. Strettell until 1870, by Captain Douglas till 1871, and by Mr. Drysdale since that time.

Areas.

3. The total area of Berar is 17,000 square miles, and its population 2¼ millions according to the census of 1867. The cultivated area, according to the Administration Report for 1876-77, amounts to 11,123 square miles, and waste and forest to 6,605 square miles, of which 2,262 are culturable and the rest unculturable waste. Of the unculturable area, however, only a very small proportion is in charge of the Forest Department—

Melghát reserves	726
Reserves in other districts	675
Protected forests	774

the rest of the forests and waste being classed as unreserved and being in charge of district officers.

Time favourable for settling definitely the forest area which may be reserved.

4. After having visited all districts except Wún, which was out of my line of march, and for the inspection of which I could not spare the time, and after conferring with the late Commissioner of Berar, Colonel Nembhard, and several Deputy Commissioners on the subject, I have come to the conclusion that circumstances are sufficiently advanced in all districts to attempt the separation between those waste and forest lands which may be given up for cultivation and those which should be retained permanently as forest.

The following statement shews the area which, according to the proposals of the present report, it is proposed permanently to reserve as forest in each district:—

Districts.	Area.			Reserves.	Protected forests.	Total Reserves and Protected Forests.	Percentage of Reserves to total area.
	Cultivated.	Uncultivated.	Total.				
Amráoti	2,172	595	2,767	74	...	74	2·7
Akola	2,211	443	2,654	46	269	315	1·7
Ellichpur ...	968	1,655	2,623	633	867	1,500	24·1
Buldána	2,081	726	2,807	115	457	572	4·0
Wún	1,827	2,092	3,919	270	969	1,239	6·8
Básim	1,864	1,094	2,958	163	262	425	5·5
Total ...	11,123	6,605	17,728	1,301	2,824	4,125	7·8

It will be noticed that only in the Ellichpur district a large proportion—above ⅓rd—of the waste has been included. In the other districts the proportion of waste included in the reserves is between ⅛th in Buldána and $\frac{1}{10}$th in Akola. Similar fluctuations will be noted in the percentage of permanent forest land to the total area of each district, which is between 24 per cent. in Ellichpur and 17 per cent. in Akola. The percentage of the reserved forests in the whole province to the total area is 7·8 per cent. It will be borne in mind that a large proportion of the waste is not at the disposal of Government, but is included in 'jaghir' villages and (Wún and Básim) in 'izarah' villages: hence the difference between the area of waste lands and the aggregate of the reserved and protected forests which is largest in Wún and Básim. Nevertheless, it would be a bold assertion to maintain that the areas to be permanently kept up as forest had been finally determined. A closer examination of the waste lands at the disposal of Government will doubtless shew that additional reserves can, and ought to be, formed in many places, with manifest advantage to the country. So much, however, can now be said, that the chief work of demarcation has been completed, and that it is not likely that more than 10 per cent. of the whole province will be permanently demarcated as forest.

Formation of divisions.

5. In order to complete what has yet to be done in the way of demarcation, no separate demarcation staff seems to be needed in Berar; the work can be accomplished by the Forest Officers in communication with the Deputy Commissioners. It will, however, for this purpose, be necessary to consider how the superior staff should be organised, so as to ensure the satisfactory progress of this work, as well as the efficient protection and improvement of the demarcated reserves. For this purpose it will be necessary to form the following four forest divisions:—

First: *the Melghát division*, comprising the charge of the reserved forests in the Melghát hills, the area of which, as explained, will aggregate 626 square miles. The Melghát officer should have his head-quarters at Ellichpur, with permission to go up to Chikalda during the summer. He will have charge of the demarcated reserves and of the two nakas Kalamkar and Kazildoh, which are situated within the Melghát, and he will collect the grazing dues in the forests outside the reserves; but as it is not proposed to maintain any restrictions upon the cutting of wood or bamboos outside the reserves, he will have no further concern with those lands.

Within the reserves there are, and will always be, a few villages, and to each village will be assigned a tract of 'village forest' for their requirements.

He should have charge of these villages in all revenue matters, but will have no civil or criminal jurisdiction.

It is obvious that there will be many matters in which he will have to work under the instructions of the Deputy Commissioner, and although we do not propose that he should, as a rule, receive his orders from that officer, yet it should be distinctly understood that he must act in all matters affecting the inhabitants of the Melghát in subordination to the Deputy Commissioner, and he must keep the chief Forest Officer in Berar informed of all his communications with that officer.

The *second* division will comprise all reserved forests in the Amráoti and Akola districts, as well as in the plains of Ellichpur. The officer in charge of this division will have charge of the line of nakas outside the Melghát hills; he will have the Amráoti hills, which will be a very important part of his work, and the babul buns in the Púrna valley. The head-quarters of this division will be at Amráoti. This division may conveniently be designated as the *Púrna division.*

The *third* charge will be the *Wún division*, comprising the demarcated reserves of the Wún district, both the Kelapur reserve as well as the so-called district reserves. The head-quarters of this division will be at Yeotmal, and his relations to the Deputy Commissioner of Wún must be similar to those of the Melghât officer to the Deputy Commissioner of Ellichpur.

The *fourth* charge will be the *South Berar division*, with head-quarters at Básim, and this charge will comprise the reserves including the district reserves of the Básim and Buldána districts, including the small corner of Ghátbori, which is in Akola.

It is not proposed that the officers in charge of the Púrna, Wún, and South Berar divisions shall have any concern with the Government forests outside the reserves, which in future will be called 'protected forests.' These should be managed by the Deputy Commissioners through the tehsildars of talukas.

Divisional officers, as a rule, to have charge only of demarcated reserves.

6. The summary of these proposals is that, as a rule, divisional Forest Officers will only have charge of the demarcated reserves which it is intended permanently to retain as forest; and as additional reserves are formed, they will be placed under one of the four forest divisions.

In like manner, the subordinate forest establishments of forest rangers, foresters, and forest guards will only have charge of the demarcated reserves, and will have no concern with the protected forests. These proposals are made on the understanding that the present district reserves will also be in their charge, and that the demarcation of additional reserves will be proceeded with wherever suitable land at the disposal of Government can be had.

Relations between district and forest Officers. Control of protected forests.

7. Of the four charges here proposed, two, the Melghát and Wún divisions, are situated each within the boundaries of one civil district, and here the relations between Deputy Commissioner and district Forest Officer can be, and should be, placed on a definite footing. As regards the two other charges, each of which comprises forests situated in several civil districts, it will be sufficient to say that the Forest Officer should, in all matters connected with the requirements of the people in the vicinity of the reserves, act in subordination to the Deputy Commissioner of the district, keeping the chief Forest Officer of the province regularly informed of all his proceedings.

The chief reason why it is not considered expedient at present to place the protected forests under the Forest Department are the following:—

First.—It is not possible to make the forest charges in Berar in all cases coterminous with the civil districts.

Secondly.—The control exercised over the protected forests is exceedingly limited, and it does not appear necessary to increase the restrictions now existing in these lands, because, as explained, the chief work of demarcation has been completed, and the greater portion of the area which can be permanently maintained as forest has already been demarcated. It may confidently be foreseen that, excepting the Melghát, by far the greater portion of the Government waste lands now included within the protected forests will gradually be broken up for cultivation, and therefore it appears more natural that these waste lands should entirely be in charge of the civil officers.

Increase in the present superior.

8. In order to make it possible to maintain the superior staff here sketched at its full strength, it will be necessary to attach a supernumerary superior

Establishment necessary.

officer to the forest administration of Berar, so that in case of sickness or casualties vacancies can immediately be filled in a satisfactory manner. It will not be difficult to find full and useful employment for a supernumerary officer in the plantations of the Melghát and in Kinwat Korat, in the works which must be undertaken for the improvement of the Amráoti hills or in demarcation work.

The head-quarters of the chief Forest Officer are at present at Chikalda, but I am decidedly of the opinion of Mr. Drysdale, that while not in the forest, he should reside at the same place as the Commissioner, *viz.*, Amráoti. This will not prevent his making Chikalda his head-quarters for the hot season, and it will be well to retain the bungalow at present occupied by him there as a forest office and rest-house. This will enable him to make his inspection of the Melghát forest, which is usually done in the hot weather, without necessitating his taking an office establishment into the hills with him.

At the reorganisation of the superior staff in the provinces under the Government of India in 1876 three Deputy and Assistant Conservators were sanctioned for Berar under the chief Forest Officer; the present proposals will therefore involve the addition of two appointments, one of which, however, may be filled by a Sub-Assistant Conservator.

Financial results of forest administration in Berar.

9. The financial results of the forest administration in Berar are detailed in the statements A and B appended to these reports. The average revenue of the last four years has been about Rs. 2,56,000, while the average expenditure has been about Rs. 96,000; there is therefore an ample margin for an increased outlay on improved administration, and the proposal here made to add two officers to the superior staff is moderate, and will repay itself in increased revenue, and more than that, in a more efficient management of the permanent forest reserves.

CHAPTER II.

THE MELGHÁT.

Gawilgarh range.

10. The open country of Berar is bounded on the north for a distance of 110 miles by the Gawilgarh hills, which form the great southern branch of the Sátpura range. The base of these hills is well defined along the whole of this length, and has a general direction from east-north-east to west-south-west. The eastern part of the Gawilgarh range is situated in the Betúl district of the Central Provinces, while the western part is in Nimar; but the central and most important portion of these hills is in Berar, and is known as the Melghát. The base of the Melghát hills in Berar is about 60 miles long. To the north they are bounded by the Tapti river and the boundary of the Betúl district, and the total area occupied by the Melghát is about 1,500 square miles. The land revenue amounts to Rs. 25,000.

Importance of the forest lands on the Gawilgarh range

The greater part of the Berar valley is supplied with bamboos and building wood from this range of hills, and teak produced there finds its way to the country above ghât in South Berar. Besides this, the villages north of the Púrna river and north of Amráoti are supplied to a great extent with grass and firewood from these hills; and annually during the rains large herds of cattle from this part of Berar are sent into them for pasture. That portion of the hills which is situated in Betúl is mostly private property in the hands of malguzars, a small portion being protected forest. In Nimar, the continuation of the Melghát hills is chiefly included in the protected forest. The forests in the Melghát hills are now practically at the disposal of Government, and it is with the management of these alone that we are at present concerned. The forests on the Nimar and Betúl hills, as far as they overhang the plains of Berar, will probably ere long be exhausted; and therefore it is of the greatest importance that the resources of the Melghát should be carefully husbanded, so as to provide permanently for the forest requirements of Berar.

Configuration of the Melghat hills.

11. The watershed of the Melghát hills, which divides the tributaries of the Tapti river from the feeders of the Púrna river, runs more or less parallel with the southern base of the hills near it in the eastern, and more in the middle of the hills in the western portion of the Melghát. In the east it begins with the

Selona plateau, which is near the boundary of the Betúl district, and is connected with the Chikalda plateau by a low neck at the head waters of the Amjura Nála, a tributary of the Púrna. The area of the Chikalda plateau is about 10 square miles, and it extends to near Bairat, which is the highest point in the Melghát, rising to nearly 4,000 feet. From Bairat the line of watershed runs in a south-westerly direction at the back of Kutkali to the head waters of the Ban river. This river, which joins the Púrna 7 miles south of Patúla, is the only considerable tributary of the Púrna, which comes from the interior of the Melghát hills. From its source north of Narnála to the point where it leaves the hills it runs 18 miles in a south-westerly direction, its valley being in this part of its course separated from the plains by a continuation of the Narnála range. Here the watershed between the Ban and Púrna on the south and the Tapti on the north is formed by an extensive plateau, on which the village of Ranigohan is situated, which is the residence of the Dhulghát Rajah, and this tableland may therefore fitly be termed the Ranigohan plateau. This tableland, which is the largest in the Melghát, extends for a length of 12 miles from the banks of the Dolar river to a point west of Ranigohan. It is not a continuous plateau, however, but a succession of steps, the highest of which, containing the village of Golai, being about 2,000 feet above sea-level. On the edges it is cut up by deep valleys and ravines. It is therefore difficult to estimate its width, but it probably covers an area of about 20 square miles. From the south-western corner of this tableland the main watershed runs in a south-westerly direction, at an average distance from the plains of from 5 to 6 miles.

Feeders of the Tapti river.

12. These remarks and a glance at the map will shew that that portion of the Melghát hills which is drained by the feeders of the Tapti river occupies by far the greater half of the total area.

The principal of these feeders are the following, commencing from the west:—

1st.—The Manjiri river, which rises at the south of Ranigohan and joins the Tapti near the road which leads from Manjroth to Burhanpur. A large part of the area drained by this river is under cultivation, and there is no important forest in this valley.

2nd.—The Doal river, which drains the north face of the Ranigohan tableland.

3rd.—The Gargu river, the feeders of which drain the whole country at the back of the main line of watershed from the Ranigohan tableland to Bairat. On this river is situated the wood station of Kalamkar, by which all wood and bamboos exported from the Melghát into Nimar have to pass. The lower part of the Gargu valley is open and well cultivated, and from here along the Tapti extends to the west as far as the boundary of Nimar a stretch of open country with numerous villages.

4th.—The Sipna river, which like the Gargu has running water on its lower course throughout the year, rises at the back of the Selona plateau and runs in a nearly due easterly direction, the length of its course being about 40 miles. It divides the hills of the Melghát into a northern and southern portion. On the north side of the Sipna valley opposite the Selona plateau rises the Mákhla plateau to an elevation of 3,360 feet, and the north side of these hills, which extend into Betúl, is drained by the feeders of the two remaining tributaries of the Tapti,—the Kapra and Kandu rivers.

Rock.

13. The rocks in the whole of the Melghát hills, from the Tapti to the plains of Berar, is trap overlying sandstone, which appears in two places only on the outside of the hills, *viz.*, at Dhámangaon and Narnála, and which nowhere occupies a considerable extent of ground near the surface. The configuration of the hills is that peculiar to the great trap country of the Sátpura range: flat-topped hills descending by terraces into the valleys, the steps separating the terraces being either rocky precipices or slopes with gradients and large boulders. The valleys are deep and narrow, widening only in their lower courses. The soil presents the usual variations found on trap. On the plateaux it frequently has a reddish colour, which is perhaps due to the presence of laterite. In the lower part of the valleys stiff clay, generally called 'regar' or

black soil, predominates, while nearer the head of the valleys the soil is more light and friable.

On the flat tops of hills and on the undulating slopes in the vicinity of the valleys, the black sheet rock is frequently close to the surface for considerable areas, but in the valleys the soil is often deep and moist.

Character of forest

14. As regards the character of the forest, the Melghát does not materially differ from the great mass of the forests in the Sátpura range of the Central Provinces. The most common tree is salei (*Boswellia thurifera*).

Salei

In the outer hills it forms the chief portion of the forest, and equally so on all slopes which descend from the Ranigohan tableland, and it is common throughout the Melghát on the flat tops of hills and on undulating land wherever the rock is near the surface. Stunted forests of salei, such as are described in the chapter on the Penganga reserve, are rare, but vast extents of these hills are covered with forest, the average height of which does not exceed 35 feet. *Boswellia* is mixed with *Cochlospermum*, and in places with dhaura and lendya, but salei is not only found in the poorer parts of the forests where the soil is hardly fit to produce anything but this tree. It unfortunately forms a considerable portion of the forest almost everywhere, and is also common on good deep soil in valleys, where it takes up ground that might be stocked with trees of more valuable kinds, and in such places the tree attains a great height and a considerable size. *Boswellia* is however less common in the eastern portion of the Melghát, and there are considerable areas of valuable forests with no salei at all. The most valuable products of this forest are teak, bamboo, tinus, and anjan, and eventually bijasál will probably be of considerable importance.

Teak.

15. Teak is found nearly throughout the Melghát in valleys and ravines, but considerably less in the western portion and in the hills near the Púrna valley. The most valuable teak localities are in the valley of the Sipna and its upper tributaries on the head waters of the Gargu river, on the hills between the Kapra and Kandu, and north of the Kandu river.

Bamboo.

16. The same distribution as teak. It is scarce in the western part, though some bamboo as well as teak is found in the valleys and ravines which descend from the Ranigohan tableland. It is scarce in the outer range and the valleys which run into the plains, and the best bamboo-producing tracts are found in the valleys and ravines drained by the head waters of the Sipna and Gargu rivers.

Tinus.

17. Tinus is common on all tops of hills and on terraces, and is found scattered throughout the forest.

Bijasal, Blackwood, Khair.

18. Of bijasál, good-sized trees and a large number of straight poles are found near the edge of all high plateaux. Blackwood is scarce and always small. Khair is common nowhere.

Anjan.

19. In the south-west corner of the Melghát and extending westward into the Nimar hills, anjan is not uncommon on the outer range. Eastward it extends as far as Jiri, and to the north it is not found farther than 5 miles from the foot of the hills. It is very remarkable that anjan is found on these hills within nearly the same limits of longitude as on the gháts of South Berar, where it will be remarked its range extends from the Wagdeo block of the Ghátbori reserve and Buldána. In South Berar, therefore, its eastern limit is at 76° 53′, while in the Melghát its eastern limit is at 76° 55′. This anjan locality is the southernmost part of the great anjan belt which extends through Nimar to the Chandgarh hills north of the Nerbudda river in one direction, and westwards over a great portion of the Sátpura hills in Khandesh. The rock on which anjan is found is the same in South Berar as in the Melghát. It is trap, with an unusually large quantity of quartz enclosed in veins and nuggets. The soil is gravelly and lighter than the soil overlying trap usually is. We devoted the morning of the 7th March to the examination of the anjan forests near Jiri. The tree is here associated with salei, dhaura, lendya, and moka on the hills, and in the valleys with the trees usually found in the mixed forest on trap. A considerable quantity of teak is on the ground. The number of large trees of anjan is considerable. They have short trunks up to 20 feet in height and 6 feet in girth, and have evidently been pollarded regularly for cattle fodder and firewood. The bark is used as bast and string for a variety of purposes. The foliage of the anjan trees here is full and healthy, and we found a number of trees in full seed.

20. The other trees are those ordinarily found in the mixed forest on the trap hills of the Satpura range :— **Other trees.**

Haldu—*Adina cordifolia.*
Keim—*Stephegyne parvifolia.*
Dhaura—*Anogeissus latifolia.*
Saj—*Terminalia tomentosa.*
Lendya—*Lagerstrœmia parviflora.*
Moka—*Schrebera swietenioides.*
Jamun—*Eugenia Jambolana.*
Karka—*Briedelia retusa.*
Harra—*Terminalia Chebula.*

21. The whole forest in the Melghát is practically now at the disposal and under the control of Government. A portion of the lands is held in jaghir by the six chiefs commonly known as the Melghát Rajahs. The chief of these are the Mákhla and Dhulghát Rajahs. Their forest rights have been purchased by Government by means of an annual payment of Rs. 17,119. By means of this payment Government has acquired the right to cut timber and bamboos and to collect forest produce on their estates, as well as to levy the usual dues taken from all timber exported from the Melghát; but as a matter of fact, Government limits its interference to the levying of these dues, and no restriction is placed on the breaking up of their forest for cultivation, or on using their forest produce within the limits of the Melghát. On land not included within these jaghir villages Government is the unrestricted proprietor of all forest. The control of the Mákhla forests was obtained by exchange of land, certain villages on the outside of the reserve being made over to the Mákhla Rajah instead. **The Melghat forests under the control of Government. Rights of Melghat Rajahs.**

22. The population of the Melghát is estimated at 40,000, of whom 33,000 are Kurkus and Gonds. The number of villages is 324, of which 28 are held in jaghir.* From time immemorial the Kurkus and Gonds have been in the habit of cutting timber and bamboos in the Melghát and collecting minor forest produce, and of exporting these articles into the plains. The inhabitants of the villages near the foot of the hills in Berar have also been in the habit of sending their cattle for pasture into the outer ranges, and of bringing grass and firewood from them. Government has, however, always exercised the right of controlling these privileges in the forest, and of levying such dues as were from time to time fixed. **Privileges exercised by the villages.**

23. Until 1868 the system was to lease the right of levying dues on forest produce within certain limits to the highest bidder, the rates according to which these dues should be levied being fixed by Government. These leases included the right to levy dues on produce imported from the Nimar and Betúl districts of the Central Provinces. **Rights to levy dues leased until 1868.**

24. In 1868 a new system was introduced by Mr. Drysdale, who was then in charge of the Melghát forests under the Conservator of the Central Provinces; a line of nakas was established at the foot of the hills, extending from Jámod on the west to Hiwarkhed on the east, and a special establishment was entertained for collecting the dues at these stations. These stations were chiefly selected at those places where weekly bazars were held, the hill people bringing their timber and forest produce for sale, and taking back in return salt, goor, cloth, and condiments. **From 1868 dues were levied by Government.**

25. A regular system of weekly bazars, which are a great convenience both to the hill people and the people of the plains, has thus been developed by the **Establishment of a system of**

**Jaghir villages.*

Raja Khuman Singh :—
1. Kara.
2. Nándúra.
3. Codechikhli.
4. Jambu.
5. Labada.
6. Kota.

Raja Tara Singh :—
1. Lokta.
2. Susarda.
3. Chendu.
4. Titamba.
5. Paláskundi Buzurg.
6. Kanjoli.
7. Ranigohan.
8. Dhulghát.
9. Bahur.

Raja Mangal Singh :—
1. Henar.
2. Saloni.
3. Rohankidki.
4. Kúardeo.

Raja Man Singh :—
1. Daramdoh.
2. Kerida.
3. Tukra.
4. Chowramal.
5. Amlapatti.
6. Jamgarh.
7. Gúrguti.
8. Sakri.
9. Fatapúri.

Total villages 28.

weekly bazars.

Forest Department. The most important bazars are *Jiri* in the west, *Kásod* in the centre, and *Dhámangaon* on the east; near the Tapti there is the station of *Kalamkar*, where all the forest produce exported into Nimar pays duty. Besides the Kurkus, people of Nimar come into the Melghát across the Tapti and export their produce *viá* Kalamkar. Banjaras and Multánis also are engaged in cutting bamboos and timber and exporting it to the bazars. The inhabitants of the plains of Berar do not generally enter the hills, except to a short distance to bring out grass, firewood, charcoal, and lime. They, however, have to pay duty like every one else.

Grazing dues.

26. The licenses for grazing are granted by the tehsildars of the taluks at the foot of the hills, as well as by the Deputy Conservator of Forests. In 1874 the Government of India, on the representation of the Chief Commissioner of the Central Provinces, directed the discontinuance of the levying of dues on all timber and forest produce brought into Berar from the Central Provinces, provided satisfactory evidence was given to establish clearly that the articles had been brought from the forests of the Central Provinces. At the same time the Government of India ordered that on wood and other forest produce imported direct from the Central Provinces into Berar, whether east of the Melghát from the Betúl district or west of the Melghát from the Nimar district, no transit duty should be levied, nor should passes for the protection of such produce be required or any control over it be maintained. Accordingly all duty stations which had hitherto been maintained in levying duty on Central Provinces produce were abolished. The names of the nákas abolished were Ambara, Hiwarkhed, Bisroli, and Sendurjana.

Bairagarh reserve. Forest requirements of resident population.

27. So far regarding the export of forest produce. Regarding the manner in which the forest requirements of the resident population are met, the following remarks appear necessary. In 1866 the Bairagarh reserve on both banks of the Sipna was demarcated by Captain Mackenzie, then Assistant Commissioner of the Melghát, and within the demarcated tract the cutting of teak, tinus, and blackwood was prohibited. The arrangements, however, under which the privileges of the inhabitants were regulated, were subsequently more clearly defined, and it was laid down—

1st.—That the inhabitants might fell, free of charge, for home consumption, all woods except teak, tinus, and shisham.

2nd.—That they might graze cattle or cut grass untaxed within their village area.

3rd.—That they might take up land for cultivation anywhere within their village area, so long as such land did not contain any teak or shisham.

4th.—That they might collect minor forest produce within the reserve free of charge. At the time the reserve was demarcated there were a considerable number of inhabited villages within it. By a revision of the boundaries many of these have been excluded, others have emigrated, and now the number of inhabited villages inside the boundary is only 57.*

The total area of the reserve is about 425 square miles. The aggregate area of the inhabited villages is not known, nor are their boundaries demarcated on the ground, but it is believed that the patels know the boundaries of each village. Mr. Drysdale informs me that he experiences no difficulty on account of the extension of cultivation within the villages.

Working of forests not included within the reserve from 1872 to 1876.

28. The forests not included within the reserve were designated as unreserved forests, and in 1872 a plan was commenced as an experiment to divide these unreserved forests into fifteen blocks, and every year to open one block for the cutting of teak, tinus, and shisham on rotation, the cutting of unreserved woods and bamboos remaining unrestricted over the whole area of the forests. This plan, however, caused dissatisfaction among the inhabitants of the forest, and it was modified in 1876 and the following arrangement substituted, which is the one now existing.

Formation of district (Gugumal) reserve in 1876.

29. A second reserve has been demarcated, comprising a portion of the Western Melghát. This has been styled district reserve, and its area is roughly estimated at 300 square miles. This district reserve, which is called Gugumal,

* These have since been reduced to 52 villages.

has been divided into fifteen blocks, one block being opened annually for the cutting of timber for export, and three blocks in each year for the cutting of bamboos. Neither in the district reserve nor in the Bairagarh reserve are the lands of any jaghir villages included. In the district reserve the following rules are maintained.

In the block opened for that purpose the inhabitants may cut free of charge for home consumption teak, tinus, and shisham. For home consumption they may cut all other woods in any portion of the reserve. For grazing they have to take out passes as in the protected forest. Grass can be cut free throughout the reserve. They may take up land for cultivation anywhere within their village areas, but must not cut teak or shisham, except when the land falls within the open block.

Unreserved or 'protected' forests.

30. They may collect minor produce within the reserve free of charge. The forests not included within either the Bairagarh or district reserve are termed 'unreserved' (*now 'protected'*) forests, and in these land may be broken up for cultivation, and any kind of wood or bamboos may be cut without restriction.

Quantity of forest produce exported into Berar from the Melghat.

31. Before discussing the future management of the Melghát forests it will be well to draw attention to two statements exhibiting the revenue realised from it. Statement C shews the revenue and expenditure of the reserve during the last 7 years, and Statement D the revenue realised from the rest of the forests. All revenue realised from the reserve previous to 1871-72 is included in Statement B. From these statements it will be seen that the amount realised from the reserve has been Rs. 83,330, and from the unreserved forests Rs. 10,70,819: thus the total amount realised annually is Rs. 90,000. The revenue realised by Government at the bazars and duty stations represents about one-fourth of the market value of the produce taken past those stations; and in the case of the produce exported from the reserve the revenue realised from timber represents about half of its market value at the foot of the hills, and in the case of bamboos about one-fourth. These data justify our estimating the average value of forest produce exported from the Melghát into the plains of Berar as exceeding Rs. 4,00,000, this being the probable market value of the produce at the bazar and duty stations at the foot of the hills. This amount includes a small quantity of produce exported from the Melghát into Nimar *viá* Kalamkar, which varies exceedingly according to the extent of forest opened from year to year in the Nimar and Hoshangábad districts. In the 3 years 1874 to 1877 the duty realised at Kalamkar amounted to Rs. 10,000, or Rs. 3,300 per annum on the average. Taking this into account, it may safely be said that the value at the foot of the hills of all forest produce exported from the Melghát into the open country of Berar during the last 11 years has been considerably less than Rs. 4,00,000.

The districts provided with forest produce from the Melghát are Ellichpur, Amráoti, Akola, and half of Buldána. According to the census of 1867 this population amounted to about 1,500,000, so that the value of forest produce consumed by each head of the population during those 11 years may be estimated at 4 annas 3 pies. This does not, however, represent the entire quantity of fresh produce consumed by the population of the Púrna valley, for large quantities of wood and bamboos are imported from the Central Provinces. Nevertheless, as already explained, a large portion of Berar is dependent upon the Melghát forests, and it is important to maintain, and if possible to increase, the productiveness of those forests.

Suggestions regarding management.

32. The following remarks may most conveniently be divided under three heads: *first*, management of Bairagarh reserve; *second*, management of the other forests, which it may be decided to reserve permanently; *third*, management of the protected forests.

Protected forests.

33. Beginning with the last-mentioned class, or the forests not included in any reserve, we are of opinion that it will be best to abandon all idea of forest conservancy. At present *dhya* cultivation is prohibited, but otherwise the forests are open to all. Reserved and unreserved kinds of wood may be cut by any one, subject only to the payment of duty as previously explained. Cattle may graze, subject to the taking out of licenses and the payment of grazing dues; and land may be broken up for cultivation, subject to the permission of the civil authorities. I have had the privilege of discussing this subject with

Captain Mackenzie, the Deputy Commissioner, and I have come to the conclusion that the best plan will be to maintain the existing state of things. It has been supposed that the prohibition to cut dhya was one of the causes which induced the Kurkus to leave the Melghát and to go across to the Central Provinces, and it has been proposed, in order to stop this emigration, to permit dhya cultivation outside the reserves; but, on the other hand, Mr. Drysdale informs me that there has lately been a great immigration from the Central Provinces; and, as a matter of fact, no conclusions can be drawn from the fact that a number of families cross the border in one or the other direction. These spasmodic fits of emigration generally are caused by accidental circumstances of a temporary nature. Dhya cultivation, quite apart from forest conservancy, is undoubtedly a great evil, and we have come to the conclusion that even outside the reserves it should not again be allowed. If these forests were open to dhya, the result would be that it would attract a number of poor people from the neighbouring districts, which would be no advantage to the progress of Melghát.

Reserved forests: their area.

34. As regards the reserves, I may say at the outset that I am of opinion that eventually a considerable portion of what is now included within the limits of the reserve may, with advantage, be given up for cultivation; but this must be done gradually, with the primary object of providing for those villages which are now included within the reserve. Until that is effected, the area at present demarcated as reserved should remain under the control of the Forest Department. In this respect also I recommend that the present state of things remain unchanged. But I am of opinion that it is desirable to form an additional reserve west of Jiri, on the outer range of hills, which is stocked with anjan. The area of this proposed reserve, however, will not exceed 50 square miles, and will probably be less. Including this additional area, the total area of reserved forest will stand as follows:—

Bairagarh reserve	425
Present district reserve (Gugumal)	300
Proposed Jiri reserve	50
TOTAL ...	775

Supply of forest produce and revenue of the Melghat forests.

35. We have explained above that the data at present available regarding the export of forest produce from the Melghát do not furnish us with any information regarding the quantity of this produce. But we know the revenue realised on these exports, and can from that form a fairly reliable estimate regarding the value of the produce at the foot of the hills. We know that this value has during the last 10 years been on the average Rs. 4,00,000; during that period it has been yielded by the whole forests of the Melghát hills, and although many portions of these forests have chiefly, by means of these exports, become exhausted of teak and bamboos, yet it is evident that an area of nearly 800 square miles of forests protected from fire and worked according to a regular system must be more than sufficient to furnish the quantity of produce hitherto exported from the Melghát. In the absence of more precise data it is impossible to enter upon the question of what area should be kept under forest in Melghát in order to secure a continued supply of forest produce to Berar, but we may safely assert that 400,000 acres of well-stocked forest carefully managed and efficiently protected will yield a very much larger quantity annually than the present supply of forest produce from the Melghát to Berar.

The area of forest required in the Melghát must, however, not be measured by the present export of forest produce from the Melghát, for that will increase steadily, and probably be more than doubled at the end of the next 10 years. The figures of statement D (see paragraph 31) give a fair, though not complete, idea of the increased demand for forest produce in Berar. It will be seen that during the first 3 years the realisations gradually increased from Rs. 50,000 to Rs. 73,000; then, on the introduction of direct collections by the Department, the revenue rose to Rs. 1,01,000 in 1869-70, and Rs. 1,14,000 in the following year. In 1871-72 the realisations diminished to Rs. 77,500, and in the following year to Rs. 68,000.

This great diminution in the value of produce exported from the Melghát during the year 1872-73 is explained by Mr. Drysdale as having been caused by the sudden closing of the protected forests in May 1871 against the cutting of teak,

and not by any diminished demand in Berar. The last five years of the statement shew that the realisations fluctuated between Rs. 82,000 and Rs. 1,23,000. So much is clear, that there has been a considerable increase, subject to fluctuations, in the export of forest produce from the Melghát during the last 12 years, and this increase is certain to continue and at a more rapid rate when the road from Ellichpur to Pili has been opened. The rates of duty levied on the produce, as well as the system of collecting dues, have not been materially changed during this period.

Within a very few years the fire-protected portion of the Melghát will be capable of furnishing a very much larger quantity annually of bamboos and timber. This, as a matter of course, will diminish the price of these articles, and this again may be expected largely to stimulate consumption.

In discussing the question, therefore, what area should be kept permanently under forest in the Melghát, we must not measure the quantity of forest produce required from it by the present rate of consumption, but are perfectly justified in assuming that this quantity will increase very largely and may be doubled within a few years, and may become many times larger within a few generations; even if we possessed precise data regarding the quantity of forest produce exported during the last 10 years from the Melghát, such data would give us no help whatever in determining the area which required to be kept under forest in this district, for by the time that our reserves will have become fully stocked, and will have attained that rate of production which their soil, climate, and present growing stock justify our expecting, these data will have changed completely, and the demand for forest produce from the plains of Berar will be many times larger than what it is now.

During my journey through Berar I have been forcibly struck by the fact that, compared with other parts of India, the houses of the peasants are poor, and that very small quantities of timber and bamboos are used in building them; but I have been equally impressed with the fact that the houses are poorer in the open country of the Básim and Buldána districts above the gháts than in the valley of the Púrna river, and that again in the Púrna valley they are much better built and with a much larger expenditure of wood and bamboos north of the river in the vicinity of the hills where the forests are near, and wood and bamboos are easily obtainable. I feel convinced that, as the price of timber and bamboos diminishes, and their supply becomes more abundant, the custom of building substantial houses with good roofs will extend further south, and that the consumption of forest produce will increase steadily to an extent we cannot foresee. Any attempt now to solve the question, what area must be kept permanently under forest in the Melghát, in order to provide for the requirements of Berar, is impossible, for the Melghát is not the only source of supply, and therefore nothing more need be said on this subject.

So much, however, is certain, that 500,000 acres is a very large area, and that it is much better to diminish its extent with a view of having a smaller area at our disposal free of all villages and of cultivation.

Provision for the villages at present in the Gugumal reserve.

36. The area proposed to be demarcated in the outer hills west of Jiri, and which has been estimated at about 32,000 acres, will probably be free of all villages. In what is known as the district reserve 17 inhabited villages exist, of which I visited the following :—

1. Sontana.	5. Arao.
2. Colai.	6. Koha.
3. Dolar.	7. Dorkot.
4. Gadgapati.	8. Kund.

With a view of providing for these villages and for any others the inhabitants of which may desire to leave the Bairagarh reserve, I consider the entire western half of the present district reserve may eventually be given up, comprising the valley of the Ban river, the Ranigohan plateau, the area drained by the Doal river, and some of the western feeders of the Dolar. This portion has been worked much more heavily than the western part, and contains very little of teak, bamboo, or other valuable trees. The eastern half of the district reserve, comprising the valley of the Dolar and the country drained by the other feeders of the Garga river, should be retained.

Villages in the Bairagarh.

37. In the Bairagarh reserve we have 57 villages left, with 1,052 houses and a population of 4,333, with 5,786 head of cattle, including pigs. The area

reserve. Red soil and black soil villages.

at present cultivated amounts to 5,865 acres, and if fallows are included, the total area required for cultivation is 17,600 acres. The villages may conveniently be separated into two classes, which are commonly designated as *red soil* and *black soil* villages. The former cultivate chiefly kharif crops on the flat hill tops; they take from two to six crops in many years from each field, and then allow it to lie fallow from 10 to 15 years. On black soil the chief crops are *rabi, viz.*, wheat, gram and lentils, and the fields are, as a rule, cultivated every year. The villages which cultivate chiefly on black soil are of a more permanent character, and it is rather an advantage than otherwise to keep them in the reserve. Instances are, Harisal on the right bank of the Sipna, Bútram in a rich valley near the northern boundary, Hatru near the Kandu river, and Kaori on the Kapra river.

Black soil villages to be retained.

The black soil villages number about 10; they are the most populous and important, and they should, in my opinion, be retained to the reserve. At present the inhabitants of those villages are satisfied with existing arrangements, but eventually it is for consideration whether their area, including a certain amount of forest land, should not be separately demarcated.

Red soil villages: their disposal.

38. It is different with the so-called red soil villages. Their cultivation, in order to be profitable, requires the burning of branches on the fields, and this is prohibited here, as well as in the rest of the Melghát.

The result is that they are dissatisfied; they will doubtless prefer to leave the reserve or to settle in black soil villages. This will be an advantage, as their shifting mode of cultivation frequently leads them to make clearances in the midst of teak localities. An abundance of land can probably be found for any village that may wish to leave the Bairagarh reserve, either in the protected forests, or in that portion of the district reserve which it is proposed to give up; but should any of them prefer to settle in the vicinity of their former homes, there will, in my opinion, be no difficulty in setting apart a certain portion of the reserve for this purpose. The portions which have been suggested for this purpose are: *first*, the block west of the lower course of the Kapra river and north of Chaorakund, which forms the north-west corner of the reserve; *second*, a block south of the Kapra river and north of the Raipur block, between Jambra and Bíd; *third*, a narrow belt south of the Betúl boundary and north of the Kandu river and the main road leading to Mota in the Betúl district.

Effect of these proposals on the supply to the plains of Berar through the nakas.

39. Before discussing the management of those areas which it is proposed permanently to maintain as reserves, it will be necessary to consider how the supply of the different portions of Berar will be affected by the measures which we have proposed. Statement E shews the realisations at the different wood stations during the 3 years ending with 1876-77, from which the open country is supplied with forest produce. Nos. 1 and 2, Bahram and Karpi, receive their supplies from the unreserved forest east of the Bairagarh reserve. The four next, of which Dhámangaon is the chief, receive their main supplies from the reserve. The 5 stations from Borala to Kásod are nearest to the head waters of the Gargu river, and are chiefly supplied from those forests which it is intended to maintain permanently as a reserve. There remain the 4 western stations Kirkera, Jiri, Kamod, and Wasali. These are at present supplied from the western portion of the district reserve, which it is proposed to give up. But they will continue to draw certain supplies from the protected forests, and from the new reserve proposed to be formed west of Jiri. The effect of the arrangements here proposed will, doubtless, be to hasten the exhaustion of all forest lands not included within the reserves. But this, as shewn, will not materially affect the supply of the chief lines of export into Berar. A glance at the statement will shew that the three chief stations are Dhámangaon, Kásod, and Jiri, as the revenue realised at them averaged during the last three years between Rs. 11,000 and Rs. 13,000. Of these three the two first named will not be affected at all; and though the supplies sent to Jiri from the forest nearest to it may eventually diminish, it must be remembered that, if a demand at that place should arise, it would speedily stimulate the carriage of produce to it from the most distant parts of the Melghát. I learnt on the spot that it was not a rare thing for forest produce from the head waters of the Gargu river to be sent round *viá* Golai to Jiri; and I am informed that a large proportion of the wood cut in the blocks opened in 1872 and 1873 was taken round to Jiri.

The supply to Kalamkar will not be affected by the arrangements now suggested to be made.

40. It has been mentioned above that, commencing in 1876, a system of cutting by rotation was commenced in the district reserve, one block out of fifteen being opened every year for the cutting of timber, and three blocks out of fifteen for the cutting of bamboos, it being contemplated to protect the entire district reserve against fire.

Cutting by rotation in Gugumal reserve to be stopped.

I examined three blocks in which cuttings had been made according to this system of rotation, which was introduced into the unreserved forests in October 1872. The forest in which these cuttings were made were open and very thinly stocked with teak. The chief wood cut was teak; and in forests of this description I think it is a matter of regret not to utilise the beneficial effects of fire conservancy to the utmost. Teak in the Melghát, as everywhere else, benefits in a marked manner by fire protection. But this benefit is lost if the greater number of seed-bearing trees is cut. It is quite a different thing in a well-stocked forest; here you may cut out a large proportion of the seed-bearing trees without largely diminishing the springing up of seedlings. But in a forest like that in question, in which teak is thinly scattered, the effect of fire conservancy with simultaneous cutting of teak is to convert it into a forest in which the less valuable trees predominate. Moreover, under this system of rotation it is not practicable to treat each locality in accordance with the requirements of the growing stock; and I am of opinion that, after the areas proposed to be given up for cultivation have been excluded, it will be better to treat all the remaining portion of the district reserve according to the same plan as the other reserve of the Melghát, and the present system of rotation should then be brought to a close. In a forest so thickly stocked as that to which the present remarks relate, the only hope of improvement seems to me to be in closing it absolutely for a time, and in regulating all cuttings which may become necessary, not by a rigid system of rotation of extensive blocks, but by the peculiar character and requirements of each locality.

If the preceding proposals are accepted, there will be in the Melghát only one class of reserves, which will consist eventually of the Bairagarh reserve, excluding the blocks proposed to be given up, the eastern half of the present district reserve, and the new reserve proposed to be formed in the outer hills west of Jiri. The whole area included in these reserves will be on one footing, and be subject to the same system of treatment.

The forest lands not included within these reserves will be released of all restrictions in the manner explained above.

41. The demarcation of the existing reserves of the Melghát is distinguished by an important feature,—the judicious selection of natural and permanent boundary lines wherever such was practicable. Of the southern boundary of the Bairagarh reserve, only 500 yards are a cut line; the rest consists of a precipitous scarp north of the Silona plateau and of nálas. The western boundary is formed by the Kelinádi, the Sipna, and a well-frequented timber-dragging road, excepting a short distance near the Tapti river. The eastern boundary is defined by roads and nálas, and it is only along the northern boundary line that a considerable amount of line-cutting was necessary, and this chiefly where the Betúl district adjoins the Bairagarh reserve.

Demarcation of the boundaries of the Bairagarh reserve.

The boundary of the Bairagarh reserve has a total length of 87 miles, of which 61 miles are defined by precipices, nálas, or permanent roads, while 26 are cut lines, of which 21 form the boundary between Berar and the Central Provinces. The boundary lines when cut are 40 feet wide with pillars at convenient distances. The pillars consist of conical heaps of stones with posts in the centre let about a foot into the ground and with a serial number cut out in zinc. Boundary pillars are also erected at convenient distances where the boundary runs along roads.

42. The present district reserve is entirely bounded by natural lines. Whenever, owing to the exclusion of land on the formation of new reserves, fresh boundary lines are established, the present practice should continue to be observed. The existing boundary pillars I am not inclined to regard as final, but for the present they are very useful and perfectly adapted to the circumstances of the forest.

Boundaries of the Gugumal reserve.

Maps of the Melghat reserves.

43. For the whole of these reserves maps are available on the scale of 1 inch to the mile prepared by the Topographical Survey which worked in the Melghát during the season 1860-61. Copies of these maps have been prepared with the boundaries sketched in. These maps are exceedingly useful and sufficient for all present purposes. It will, however, be necessary, whenever the boundary does not follow lines surveyed and represented in the map, to make a survey of it in order to enter it correctly.

It will also be necessary to prepare some copies of the map without hill shading, or with only an indication of the features, and to complete these skeleton maps by entering as many local names as can be ascertained from the inhabitants of the reserve. It is of great importance as much as possible to preserve the existing names of nálas, hills, village sites, and other places. The operation of ascertaining and entering these names in the map should be made the duty of the divisional officer at an early date. It is a difficult, but at the same time an important operation, which should receive full attention.

Roads.

44. Before discussing the subject of blocks and compartments it will be useful to state the chief lines of roads existing and proposed which traverse the reserves.

The whole Melghát is traversed by innumerable timber-dragging paths. In the Bairagarh reserve most of these paths are not used at present, but the lines followed by the principal ones can in most instances be traced. In the district reserve these dragging paths are in full use and form a perfect system of communication lines. Besides these there are village paths, which in many cases follow timber-dragging roads.

New road from Ellichpur to Pili.

45. The most important line for the export of produce will in future be the new road under construction from Ellichpur to Pili, a distance of 36 miles. This road is intended to ascend the Sipna valley to Sirisban and to cross the range by the Kuana Ghát 9 miles east of Chikalda. This road is being built by the Public Works Department, and I understand that the first 11¼ miles from Ellichpur have been completed.* It will be a 2nd class road with culverts and small bridges, the larger streams being crossed on stone dams.

It is most desirable that this road should be completed as soon as possible, as it will place the system of export of forest produce upon a different footing. Carts from the plains will, during the dry season, come to Pili, and there will therefore be greater competition for bamboo and timber, and consequently better prices.

Carts have gone from Pili to Kalamkar: that line can easily be made into a fair weather cart track, and when this is completed, there will then be a continuous line fit for wheeled conveyances through the entire length of the reserve from Sirisban to Kolkaz.

Other roads in the Bairagarh reserve

46. It will be a great advantage to have eventually a system of cart roads through the reserve which may serve as feeders to this line, and with the exception of the high country about Mákhla there is no part of the reserve which cannot be opened up for cart traffic. But for the present we will confine our suggestions to the main line of traffic from north to south which joins the Sipna river at Sembado. We have already mentioned an important road which runs through the northern portion of the reserve and which leads to Mota in the Betúl district in the Tapti valley. The line from north to south now mentioned joins this road near the Kanda river and runs through Hatra and Raipur to Sembado. After the completion of the Pili road we consider that the construction of a road along this line should be considered. The only difficulties of importance are the descent into the Kuapati nála and the ascent on the north to the Raipur plateau, but these difficulties can easily be overcome.

Fire protection in the Gugumal reserve.

47. The eastern half of the present district reserve has been partially protected during the hot weather of 1876. The protection of this reserve has been effected by burning a line all round wherever it is not bounded by natural boundaries, such as the Ban river, which are regarded as effectual barriers. It has already been explained that, for the purpose of cutting, this reserve has been

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*. The *first section*, 11¼ miles long, has been completed; in the *second section* of 5¾ miles the earthwork has been completed, and the bridging finished to the end of the 15th mile, the metalling and two miles of bridging remain to be done; in the *third section* of 9 miles two-thirds of the earthwork has been completed, but the masonry has not been begun; in the *fourth section* of 8½ miles work has not yet commenced. The total length of the road will be 34½ miles.

divided into 15 blocks, chiefly by means of natural boundaries. Where these boundaries were not considered as sufficient barriers against the spread of fire they were burnt and several other fire-paths were burnt in addition, so that for this purpose of fire protection the present district reserve has been divided into 24 blocks. In addition to this, all important halting places for travellers and people dragging timber have been surrounded by broad fire traces; the number of such halting places protected is 15. Until it has been decided what portion should be given up to provide for the villages at present in the reserves, it will be necessary to continue fire protection, as at present.

Fire protection in the Bairagarh reserve.

48. In the Bairagarh reserve the Raipur block was protected from fire during the hot season of 1870 and ever since. One small fire broke out in 1872 in the western corner near Kolkaz. The shape of the Raipur block is triangular and its area is 14,000 acres, and it is bounded on the south by the Sipna river, on the west by an old road leading from Kolkaz to Raipur *viâ* Bandamal, on the east by the main road already mentioned leading from Raipur to Sembado. Both roads are fire-traced every year, and on the south side the Sipna forms a sufficiently safe boundary.

The fire protection of the rest of the Bairagarh reserve was attempted in 1871, but in that year about $\frac{7}{8}$ths of it were burnt, and success on a large scale only commenced in the hot season of 1872. This result has been attained by burning the boundary line wherever it is not formed by rivers sufficiently wide to afford protection. Thus, the western boundary from the Sipna to the Tapti is burnt annually, and the northern boundary where it does not run along the banks of the Tapti river. On the east side the entire boundary line has been burnt, and on the south the edge of the plateau along the cliffs. Besides the outer boundary a number of main sub-division lines are burnt every year with the object of joining the chief rivers and nálas by transverse fire lines, and thus dividing the reserve into isolated blocks. These fire lines are not numerous, but it must be remembered that the Sipna, the Kapra, and the Kandu rivers form effectual fire lines throughout their length in the reserve. The chief intermediate fire lines are the following:—

(1) The Mota road near the northern boundary of the reserve.
(2) Road from Chilatia to the Kandu river.
(3) The Ukada road from the Kandu to the eastern boundary.
(4) The Tangna road from the Kandu to the Kapra river.
(5) From the Chaorakund nála to the Kapra river *viâ* Churni.
(6) From the Sipna at Piprida *viâ* Jambu to the Kapra river.
(7) From the Rola nála near Tembru to Jambu.

These 7 sub-division lines in addition to the boundary lines of the Raipur block are the only interior fire lines maintained for the protection of this reserve, and the total length of interior fire lines does not exceed 60 miles. Of the outer boundary, which is altogether 87 miles long, 26 miles are, as already explained, not burnt; so that the total length of fire lines maintained in this reserve is about 120 miles, which is very little for a reserve of 426 square miles.

Division of the Bairagarh reserve into blocks.

49. The entire reserve is naturally divided into 84 great divisions by the Sipna, Kapra, and Kandu rivers, and it will be convenient to sub-divide these into the following 8 blocks:—

1. The *Biba block* north-east of the Kandu river called after the village of Biba at the edge of the reserve, which is the residence of one of the forest guards.
2. The *Hatru block* comprising the country between the Kandu and Kapra rivers called after Hatru village, which is the seat of one of the three foresters.
3. The *Rangubeli block* between the Kapra river and the Chaorakund nála.
4. The *Chaorakund block* between the Chaorakund and Harisal nálas.
5. The *Harisal block* between the Harisal nála and the Raipur block.
6. The *Raipur block* bounded on the south by the Sipna river and on the east and west by the roads from Sembado and Kolkaz to Raipur.
7. The *Mákhla block* between the Sipna and Kapra rivers and bounded on the west by the road leading from Sembado to Raipur.

8. The *Borkheri block* to the south of the Sipna river.

The areas of these blocks are as follows :—

	Square miles.
Biba	62
Hatru	116
Rangubeli	62
Chaorakund	38
Harisal	34
Raipur	23
Mákhla	62
Borkheri	59
TOTAL ...	426

Former number of blocks too numerous: the 8 now proposed more convenient.

50. I am of opinion that it will be best to maintain these 8 blocks at present, as they are the most natural sub-divisions of the forest, and both the working and administrative arrangements can easily be arranged accordingly. Mr. Drysdale has divided the reserve for administrative purposes into 40 blocks, and these blocks are entered on the one-inch scale map prepared by the Superintendent of Forest Surveys; some of these may perhaps be eventually used as compartments; but I am of opinion that, as a commencement, it will be preferable to have a smaller number of blocks, and the 8 suggested by me are the most natural sub-divisions.

Teak plantation in the Bairagarh reserve.

51. Every year since 1869 plantations of teak have been made, and these plantations have had the benefit of the personal supervision of Mr. Ballantyne from the beginning. Two systems have been followed, which we may briefly describe as follows :—

First system: cultivation by transplants.

First.—Cultivation by transplants. Nurseries were established, and the seeds watered from the time they were sown in the middle of March. The plants were then planted out in the middle of July, when they were from 9 inches to 1 foot high. The ground was cleared in the previous cold season of all small undergrowth and brushwood, which with the grass was burnt, all large trees being left standing. Pits 15 inches wide and 12 inches deep were dug, and the soil was left beside the pit until the time of planting. They were planted out in 1869 at 9 feet × 3 feet, and afterwards as a rule at 6 feet × 6 feet: 626 acres were treated in this manner; more than one-half are complete failures.

The largest of the areas treated in this manner was a plantation called Saoli Karita along the Sipna, and on both sides of the Saoli nála. This plantation was established in 1873-74. During the rains of 1876 the plants were on an average 6 inches to 15 inches high, and the ground was completely stocked. In autumn nearly the whole plantation was destroyed by rats, and now only those portions remain which are on the high hard soil. Another area thus treated is mainly on the north side of the Sipna, and is chiefly on high flats and gentle slopes towards the river, where 120 acres were planted in July 1871. The success of this plantation has been very unequal. On patches with black soil the majority of the plants have failed; they were not, however, killed by frost. They have also failed in a few patches of dhab grass in which rats are particularly common. The greater part of the area, however, is fairly well stocked. Out in the open the average height of the plants does not exceed 4 feet, their heads being only 6 inches above the grass. In the vicinity of other trees, chiefly near Mohwa, we noticed that the plants were much higher, attaining in places 12 feet. On the site of the old village of Pipalkota, where the soil was enriched by manure and ashes, the growth was much better. On a length of 70 feet 13 trees were measured, in height between 7 feet and 15 feet, the average height being 10 feet, and the average girth taken at breast height was 4·3 inches. There were, however, trees larger than these, of which the following were instances: one tree 10 inches girth and 20 feet high, and several 6 inches to 8 inches in girth and 12 feet to 18 feet high.

Causes of the slow growth in the Saoli Karita plantation.

52. The slow growth in this plantation must in my opinion chiefly be attributed to the absence of vegetable mould in the soil and to its hard surface, which prevents the access of air and rain-water to the roots of the plants. In the vicinity of large trees and on the site of the old village the soil is richer and its surface is much more loose. We also noticed that the growth was better on

the slopes than on the flat ground, but on these slopes the soil is more stony and therefore affords more access to air and water.

53. The best of the plantations made on this system is that west of Pili between the river and the high bank and north of the Sipna, which was planted in July 1869. The plants were put out in lines 9 feet apart and 3 feet within the lines. On a length of 43 feet along the lines ten plants were counted on an average 20 feet high with a girth ranging from 5 to 13 inches, the average height being 20 feet and the average girth 8·1 inches. Nowhere, however, is there an area equal in extent and equally well stocked as the Machna plantations in the Bhaorgarh forest of the Central Provinces; the soil of the Machna plantation, however, is mixed and much richer than that of the Sipna valley, while the expenditure on the Machna is much greater than that on the plantations in the Bairagarh reserve. Plantation near Pili.

54. In the Annual Report for 1875-76 the following areas treated under this system are entered as stocked— Areas planted under under the first system.

Pili	...	...	...	12	acres.
Rakidoh	...	...	...	13	„
Dingapati	...	...	...	11	„
Pipalcotta	...	...	...	120	„
				156	„

which, with the exception of 20 acres at Pipalcotta, may be considered as fairly correct.

55. *Second.* The other system, which may be designated as the '*notch*' *system*, is as follows:—In the cold weather the ground was cleared as for transplanting and burnt over. Notches were made with pickaxes in the shape of a T, the ground being loosened to a depth of 4 inches. The notches were placed at a distance of 6 feet by 6 feet and an average of fifteen seeds were sown in each notch between April and June and lightly covered. Second system: 'notch' system.

On this system 1,208 acres were treated since 1872. Of this area three plantations may be regarded as fairly stocked, *viz.*:—

Bajri established in 1872,	...	82	acres.
Lubu „ „ „	...	279	„
Jamboli, 600 acres sown in 1874, of which fairly stocked about	...	500	„
TOTAL	...	861	„

The plants in the plantations of 1872 are now 4 feet to 6 feet high, while in that of 1874 the plants are on an average 2 feet high.

56. The total result may be stated as follows:— Total results of plantations

	Success.	Failures.	Total.
By transplanting	136	490	626
On the notch system	861	347	1,208
TOTAL ...	997	837	1834

The total outlay on these plantations, not including the pay of establishments, has been to the end of 1875-76 Rs. 24,726, which, calculated on the area actually stocked, amounts to Rs. 24, nearly Rs. 25 per acre.

57. A small area of 2 acres were sown at Sembado on the south bank of the Sipna on a different plan in June 1870. The ground was ploughed in belts on an average 4 feet wide, intermediate belts 5 feet wide being left untouched. The ground is a light alluvial soil, rich in vegetable mould, and is sheltered on one side by the kowa trees on the river and on the other by a range of hills. The result has been a most luxuriant growth, a number of the young trees having attained a height of 25 feet. Sowings at Sembado

Every effort must now be made to establish a system under which success will be certain with the least possible outlay.

Kolkaz nurseries.

58. At Kolkaz a large nursery has been established on a plot with excellent soil. It is watered by means of a circular wheel and two leather water-buckets, constructed on the Coimbatore pattern. In this nursery will be available in July next at least 200,000 teak plants fit for transplanting. These it is intended to plant out on the north side of the Sipna river, and thus stock large areas formerly under cultivation. The place for the nursery is admirably selected, and considering this large supply of plants these contemplated plantations by transplanting should certainly be made.

Elsewhere I am of opinion that all efforts of the Forest Officers should be concentrated in this respect during the next few years upon sowing instead of planting, transplants being used as a rule only to fill up blanks. However, under existing circumstances it is necessary to consider the arrangement both of transplanting and sowing operations.

Chief enemies of plantations in the Melghat.

59. The chief enemies to be guarded against in the Melghát are frost and rats. Frost, however, is less mischievous, as it does not kill the plants outright, but only cuts them back. I am inclined to suggest that for the present all land exposed to frost should be avoided. I do not say that eventually we may not find means for raising teak in such localities, but for the present I think we had better exclude them until the ground is partially stocked with a growth of natural trees. Under both systems of transplanting and sowing I strongly urge that the plan of continuous lines be adopted. Within the lines the plants should be close together, say, from 3 feet to 5 feet apart, but the distance between the lines should be considerable, and until experience teaches us otherwise I would suggest that the lines be 30 or 33 feet apart.

Means of preventing damage by rats: Captain Doveton's system.

60. The areas hitherto selected for the cultivation of teak in the Melghát have been chiefly deserted fields which are stocked with grass, and a few large trees, chiefly mohwa; and on which here and there a little brushwood has sprung up. In these cases a distance betwen the lines of 30 feet will probably be found most convenient. In order to guard against the ravages of rats, Captain Doveton has made a suggestion which might, perhaps, prove successful and which might be tried by way of experiment. It is well known that rats do most damage in lands covered with grass, and do not as a rule burrow where they are disturbed by the plough. Captain Doveton therefore proposes that belts about 6 feet wide should be kept clear of grass and ploughed up annually until the teak is large enough to resist the attacks of rats. If this suggestion were tried, the best plan would be to plough up belts 6 feet wide along the lines, leaving the grass and brushwood untouched on the intermediate space, the width of which would be about 25 feet. The area, however, on which ploughing is practicable is very limited. In most places roots, stones, and rocks will make ploughing impossible. The process also would be expensive, because isolated small stumps and small brushwood would have to be rooted out from the 6-foot lines, even if it were not necessary for any large trees that may be found on the lines or any large clumps of brushwood or bamboos to be cut, but in such places the lines should be interrupted. At first I would suggest that the experiment here suggested should in one part of the area be made without giving the plants any shelter, but that at the same time in another portion of the area the lines of plants should be sheltered by heaping up dry grass along the lines. On either side of the lines of plants there would be blank spaces 3 feet wide, and these should be kept loose by ploughing or harrowing every year at the commencement of the rains until the plants are large enough to be safe against rats. The plan suggested by Captain Doveton would have the additional advantage of keeping the soil loose in the vicinity of the plants for a number of years and thus stimulating their growth. In the case of areas sown I would suggest that all blanks be filled up by transplants. Such an experiment would necessarily be very expensive and could only be tried on a small scale.

Supply of teak seed.

61. Teak seed has hitherto been chiefly supplied from the Melghát itself; the small quantities obtained from Burma, Ahiri and North Kanara, and used by way of experiment, have been insignificant compared with the quantities of indigenous seed used. Hitherto on an average between 75 to 100 maunds of seeds have been used every year, which have cost us at the rate of 8 annas a maund. The expenditure on this account is small, and there is no great harm in using

more seed than is wanted; nevertheless, I think it is a subject for consideration whether eventually a less quantity of seed per acre may not be sufficient. As far as experience has gone, the seed from Ahiri has not produced stronger plants than the Melghát seed. The plants raised from Burma seed are larger and more vigorous; most of them, however, were in the Saoli Karita plantation, where they have been eaten by rats. Of the Melghát seed a small percentage only germinates the first year; the rest comes up in about equal quantities during the second and third seasons. Of the Burma and Ahiri seed a larger proportion was found to germinate the first year.

Record of all details in the Plantation Journal.

62. I cannot close these remarks without urging the necessity of recording every detail connected with the cultivation of teak in the Plantation Journal. The kind of seed used in each locality, the experience gained regarding its germination, the quantity of seed employed, should be recorded, and the amount expended on each item during the year should be stated separately.

Under the system now suggested of planting and sowing in lines 30 feet apart, it will be much easier than formerly to keep an accurate annual record of the state of each plantation. This system will also have the advantage of facilitating the planting up of blanks, whether the failures take place during the first year or subsequently.

Eucalyptus at Kolkas.

63. At the Kolkaz nursery I noticed a number of plants of different species of *Eucalyptus* (*E. rostrata, calophylla, cornuta, sideroxylon*, &c.). They were sown in January last and have germinated freely. I fear that they will not stand the damp heat of the Sipna valley, and would suggest that they be transferred* to a sheltered spot, either at Mákhla or Chikalda.

Bamboos at Kolkas.

64. A flourishing bamboo plantation of *Dendrocalamus strictus* was established at Kolkaz in August 1876. Cuttings of the roots with a piece of the stem attached were put in. Some were planted with the stems standing out, and some were planted with the stems laid flat in the ground. A special report should be made shewing what proportion of success there was in the cuttings in either system.† As already stated, there are only certain limited tracts in the Bairagarh reserve at present fairly stocked with bamboos, and I am of opinion that it will be a good plan in the teak plantations, to be made hereafter, to introduce a certain proportion of bamboo. This may be done by planting intermediate lines, say 3 lines of teak between 2 lines of bamboos, all lines at a distance of 30 feet apart. Until further experience is gained, I would suggest that the bamboos be raised in nurseries from seed. Over a large tract north of Mákhla I understand that the bamboo has flowered this year. Single clumps flower every year; there will thus be no great difficulty in procuring the necessary quantity of seed.

Cultivation of the 'Katang' bamboo.

65. The Katang bamboo, which is not indigenous in the Melghát, should be cultivated in the vicinity of the Sipna and other rivers whenever a teak plantation is made in the vicinity. Eighty clumps are now growing near Pili which were planted in July 1872, and have succeeded well.

Plantations of other species of tree.

66. As regards the other more valuable trees which are found in the Melghát, I do not think that plantations are called for at the present, though it is not impossible that it may eventually be found an advantage to cultivate bijasál, which grows vigorously and attains a large size on all higher plateaux. There is no evidence at present that large blackwood has ever been produced in the Melghát, for the existing trees are all small and badly shaped, and its cultivation does not seem to be at all expedient. Tewas is so abundant in this reserve and has propagated itself on so large a scale since fire protection, especially on the higher plateaux, that it is unnecessary to increase the supply of this wood by cultivation.

Forest garden at Kolkas.

67. The nursery at Kolkaz is most favourable for the establishment of a forest garden in which experiments should be made with the cultivation of trees on a small scale, and I would specially recommend that in this manner *Gmelina arborea* and *Cordia Macleodii* be cultivated. Fruit trees, such as

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* They have since been planted at Chikalda.

† These bamboos have flowered and seeded this year, the clumps from which they had been taken having flowered and seeded also. As far as experience has gone, both systems have succeeded equally well. A nursery from seed of this bamboo has been made near Kolkaz.

citrons, limes and oranges, graft mangoes, plantains, guavas, custard and pine-apples, should likewise here be cultivated.*

Cutting of creepers

68. Next in importance for the improvement of the forests to fire protection and plantation is the cutting of creepers. The principal creeper in the Melghât is *Bauhinia Vahlii.* We found *Vitis, Millettia,* and *Combretum,* but all these are comparatively scarce. At the time of our visit the *Bauhinia* was in full leaf, and the tracts on which it was common could readily be distinguished by their bright green colour. Belts where this creeper is common are regarded as a protection against fire, and some doubts have been entertained whether it would be at all advisable to cut this creeper and thereby to diminish the cover overhead to stimulate the growth of grass between the trees. I do not think that this consideration should prevent the cutting of this creeper. Experience in other forests, particularly in the sal forests of the Dehra Dún and Oudh, has shewn that the extermination of the creeper greatly stimulates the growth of the foliage, and that the crowns of the trees become so full and heavy that the cover overhead is much more dense than before the creepers were cut.†

Thinning out of irregularly shaped teak trees.

69. Next in order among works of improvement should be classed the cutting over of irregularly shaped and unsound teak trees. This operation has been carried on in the Borkheri block south of the Sipna river from the Keli nádi to Sembado. The slopes or high banks which overhang the Sipna valley have been taken in hand in this manner, and Statement F exhibits the result of these operations; 107,000 trees have in this manner been cut over from 1871 to 1876. They have yielded 166,074 pieces of marketable timber, which were sold on the spot for Rs. 69,896. The trees were cut and the stumps dressed by hired labour, and the felled trees were sold on the spot. The amount expended on cutting and dressing the stumps was Rs. 5,243, which amounts to 9½ pies on the average per tree. This sum includes also the cost of cutting over of all large trees of other kinds on the portion of the area cut in 1871-72. The timber of these could not be sold, but remained on the ground. We examined the cuttings of the two first years with the following results:—

Year	No. of stumps without shoots.	No of stumps with shoots.		Total number of stumps counted.
		Stumps	Shoots.	
1871-72	5	88	182	93
1872-73	15	95	289	110

Although the majority of the trees cut were old and more than 18 inches in diameter, the production of shoots has been very favourable and many of these shoots were above 12 inches in girth and 20 feet in height. This cutting, as far as it has gone, has decidedly been a success, and the forest on the slopes on which it has been made looks very well. There seems no reason why the cutting over of large trees of other kinds, especially of those which have a spreading crown, should not be continued as was done in the first year. At present it is true the wood remains unused on the ground, but this will be different as soon as the road to Pili is completed. And under all circumstances the coppice shoots of saj, lendya, haldu, and other trees do much less damage to teak than the large trees with spreading crowns. We noticed that as a rule the shoots of teak were taller than those of the other trees. In extending these operations over the remainder of the Borkheri block I would suggest some caution in several respects. In one place above Kolkaz on the 12th March we came upon a number of trees which had been cut over on the upper edge of the high bank overhanging the Sipna, on the edge of a grassy flat and in a place where no other seed-bearing teak trees were near. The spot was bare and rocky, and moreover hardly any of the stumps had produced shoots. In such localities it can only do harm to cut over old teak trees, however badly they may be

* Mr Dryadale also proposes to establish a nursery for Harra (*Terminalia Chebula*) at Mákhla.
† Creepers have already been cut in 19 square miles of the Borkheri block.

grown, and I understand that the trees noticed here were cut by mistake. In my opinion all teak trees standing near blanks should be spared to shed seed.

In extending this operation over the whole of the Borkheri block, I would suggest that the work should proceed regularly from west to east. The western end of the block between the Keli and the Kanigaon nálas was cut over in 1873-74 before that forest was included in the reserve, and the next locality to be taken in hand should be the Kanigaon nála with its feeders.

It is essential that each locality in this operation should be treated according to its requirements, and with due regard to the improvement of the growing stock, and it will be necessary to keep a detailed record of the operations completed each season. This record should contain a detailed descriptive account of each locality.

While the operation of cutting over badly-grown teak is in progress, all creepers in the locality taken in hand should be cut, and for the present I do not advocate that any creepers should be cut in any other parts of the forest except in these blocks in which teak is cut over.

Cutting of bamboos.

70. With regard to the cutting of bamboos, it appears to be that the great aim must be to open small blocks, and, if possible, each block for one season only; but there will be no objection to opening simultaneously several blocks in different parts of the reserve, provided efficient supervision is available. The time for cutting in the Bairagarh reserve can as a rule not be extended beyond the end of January on account of the risk of fire. The principal precaution in this respect is effectively to fire-trace the camping places of the cutters. It is on all sides considered to be an advantage not to permit the cutting of green bamboos formed during the previous rains. Considering that a healthy bamboo clump, which has not been overcut, produces from 2 to 6 fresh shoots every year, I am of opinion that it will suffice to close a bamboo forest against cutting for 4 or 5 years. In the localities opened for bamboo-cutting, creepers should be eradicated. It is obvious that in order to carry on this system of cutting the bamboos in rotation, it will be necessary to work according to a regular plan of operations, and the first step in this direction must be to maintain an accurate and complete record of the localities in which each season's cuttings have been made, the quantity yielded by them, with all other particulars that may bear upon the question.

Cutting of other species than teak.

71. It has already been stated that the cutting of other woods must go on simultaneously with the cutting of teak, but in this respect the different portions of the reserve are very differently constituted. As a rule, the lower part of valleys, with more stiff and binding soil, is stocked to a large extent with saj, haldu, and other trees; while in the upper part, where the soil is lighter, and on the slopes, teak frequently predominates. Nevertheless, in no part of the reserve is there any chance of the forest becoming a pure teak forest, and it may be laid down as a general rule that the trees of other kinds should be cut as much as possible wherever teak is cut.

In forests so open and irregularly stocked as the Melghát reserves, however, the chief aim, which must overrule all other considerations, should be to increase the cover overhead as much as possible. This will explain that, though other kinds should be cut wherever teak is cut, there is no ground for recommending the cutting of other woods apart from the cutting of teak. The only exception that may be made in this respect is in the case of tewas, which covers large extents of ground on the hills, pure or nearly pure. Hitherto the chief difficulty has been that other kinds of timber have not been saleable. This is remarkable, because from the western part of the Melghát large quantities of saj, dhaura, moka, and haldu are exported. In the Bairagarh reserve this is explained by the circumstance that in the open forests other kinds are common outside the Bairagarh reserve where the people have them at their very doors, and can therefore cut and export them at their own convenience.

When the cart road to Pili is completed it is probable that some kinds will find a more ready sale, and among these haldu will perhaps be the first for which a demand will spring up.

Revenue and expenditure of the Melghat forests.

72. During the last three years the revenue on account of the Melghát forests has been on an average Rs. 1,03,414, and the total expenditure Rs. 23,238.

3778

It is impossible now to say what in future the revenue and expenditure will be, but statement C, which shews the financial results of the Bairagarh reserve during the last seven years, will enable us to form some idea of the subject.

In this statement pay and allowances of the Assistant Conservator in charge of the reserve are included under B, Establishments.

It will be noticed that the last seven years' working has closed with a small deficit, the annual revenue having been on an average Rs. 11,904 against an annual expenditure of Rs. 14,621. The chief item of revenue has been the sale of teak timber which is detailed in Statement F. Besides this, Rs. 10,000 have been realised by the sale of bamboos. The other items are insignificant. After the reserves as proposed in this report shall have been finally constituted, it is certain that the revenue will considerably increase, chiefly by the increased sale of teak and bamboos, and on the opening of the Pili road by the sale of woods of other kinds. From minor forest produce no revenue is realised at present in the reserve. The inhabitants are permitted to collect mohwa, chironji, harra, honey, and gum without restriction, and if any of this produce is brought to a market it pays duty. They collect these articles on the understanding that the forest must not be fired. Mr. Drysdale considers that for the present it will not be advisable to make any further revenue from these sources in any of the permanently reserved forests, and I agree with him that it will be better to wait until fire conservancy has been still further established; no revenue is made from grazing in the Bairagarh reserve, nor is it contemplated to make revenue from this source in any of the other permanently reserved forests.

Expenditure of the reserves.

73. Regarding the expenditure on account of the reserves it is obviously out of the question in the present transition state to form any estimate, and it will be preferable to state the facts of the last three years in this respect.

The figures are exhibited in the following statement:—

Receipts and charges on account of the Melghát Forests.

Years.	Receipts.	A.—Conservancy and Works.			B.—Establishments.		Total Charges.
		Bairagarh Reserve.	Nakah Establishment.	Other Forests.	Bairagarh Reserve.	District Reserve.	
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1874-75 ...	90,897	9,311	6,732	4,691	9,004	770	30,508
1875-76 ...	82,080	6,996	7,567	3,763	9,280	1,843	29,449
1876-77 ...	1,17,136	5,644	7,086	4,542	10,645	3,792	31,709
1877-78 ...	1,23,191	6,476	20,123	3,516	11,288	5,462	55,865
Total ...	4,13,254	28,427	50,508	16,512	40,217	11,867	1,47,531

It will be noticed that under "Conservancy and Works" the charges were almost exclusively incurred in the Bairagarh reserve. Of this amount about Rs. 6,000 annually were expended on plantations; Rs. 800 for fire conservancy; about Rs. 1,000 for timber cutting; and about Rs. 200 for buildings and communications. In the district reserves the outlay under "A" was almost entirely on fire conservancy. There is no reason to anticipate that the outlay on "Conservancy and Works" will be considerably larger after the reserves here proposed shall have been permanently demarcated; more money will probably be expended on account of timber-cutting and the cutting of creepers and the improvement of communications, but, on the other hand, the plantations will, under the suggestions here proposed, cost more money than formerly.

74. The detail of the establishments as at present constituted stands as follows :— **Establishments of the reserves.**

Bairagarh Reserve.			District Reserve.			Total.		
		Rs.			Rs.			Rs.
Forest Rangers	1 on	... 80	1	on	... 60	2	costing ...	140
Foresters	1 „	... 35	1	„	... 35	2	„ ...	70
„	2 „	... 25	1	„	... 25	3	„ ...	75
Forest guards	3 „	... 15	1	„	... 15	4	„ ...	60
„ „	3 „	... 12	15	„	... 12	18	„ ...	216
„ „	12 „	... 8	2	„	... 8	14	„ ...	112
						43	„	673 or Rs. 8,076 per annum.

This is the local establishment for an area of 726 square miles, costing therefore a little over 11 rupees per square mile.

All this is permanent establishment. It will not be difficult to provide from it for the new proposed reserve to the west of Jiri.

75. If, in accordance with the suggestions made in this report (paragraph 36) portions of the Gugumal reserve are excluded, this establishment must be revised and may probably to some extent be reduced, but we cannot anticipate any immediate reduction on this account. The Jiri reserve being close to the plains will probably require a proportionately stronger establishment than the other reserves in the Melghát. Besides this permanent establishment a temporary establishment is entertained at the timber stations charged under "A, Conservancy and Works," the cost of which at present amounts to Rs. 553 per mensem, or Rs. 6,636 per annum. **No reduction in the establishment owing to changes in the reserves possible.**

There is no reason to anticipate any reduction on this account for the present.

76. Recapitulating the financial prospects of the Melghát and providing for the pay of the Assistant Conservator and his office establishment, we can make the following forecast :— **Financial prospects of the Melghat forest.**

	Rs.
A.—Conservancy and Works—	
I. Improvement of the reserves	8,000
II. Cost of timber stations (nakahs)	7,000
B.—Establishments—	
I. Assistant Conservator of Forests: pay, travelling allowance and office establishment	6,800
II. Local forest establishment	8,000
III. Contingencies and minor items	1,200
Total ...	31,000

As already explained, no estimate can be formed regarding the future revenue, but so much is certain, that the revenue realised in the reserve will increase considerably on the completion of the Pili road, while the realisations at the timber stations will probably become stationary for some time to come until the open forests become gradually exhausted; but when this has taken place the revenue fromt he reserves will doubtless suffice to make up all deficiencies. There seems good ground to suppose that the total revenue of the Melghát will steadily rise from its present amount of Rs. 1,00,000 a year, but how rapid this rise will be and what figure will be attained depends upon numerous circumstances not under our control.

CHAPTER III.

RESERVES OF BASIM AND BULDÀNA.

KINWAT RESERVE.

Situation.

77. The Kinwat reserve, which we visited on the 13th and 14th of February 1877, occupies the great bend of the river Penganga, south-east of the fort of Mahor. A portion of this tract of country was transferred to Berar at the late rectification of the boundary between Berar and His Highness the Nizam's territory.

Boundaries.

78. The reserve is bounded towards the north-east and south-east by the river and the lands of the following villages: Danora Darat (a Jaghir village belonging to Raja Udajiram), Umbri, Takli and Kharbi, Gari, Therdi and Bori. It was at one time contemplated to buy up the cultivated lands of the villages of Gari, Bori and Kherdi, which occupy a narrow strip along the river several miles long, in order to improve the boundary, but this has been found to be impracticable.

On the west side the reserve is bounded by a cut line 40 feet wide running from the river near Paroti Khurd on the south to the village of Ghadoli; on the north similar lines are cut and kept clear, where the reserve adjoins the lands of the eight villages above named near the river.

Area.

79. The area of the reserve is 53,456 acres. It consists of the area of the following villages which with one exception were not occupied when the reserve was formed.

A. Village areas entirely included:

Korat (this village was occupied when the reserve was formed and the cultivated lands were bought for Rs. 1,147-9-8), Digras, Kati, Kasumbi, Kowtha, Dahili, Mohodi, Pawnála, Nain, Jawrala, Titwi, Wargaon, Damsari, Yerdi, Thar bazurg.

B. Village areas partly included:

Ghadoli, Soit, Morchandi, Yekamba, Sondabi, Paroti bazurg, Paroti khurd, Bori, Therdi, Gari, Kharbi.

Villages.

80. The villages enumerated under B were all inhabited when the reserve was formed, but none of the area actually cultivated and occupied was included. It will be remembered that, although under the procedure of the Revenue Survey the entire country is divided into village areas, so that every acre of land, whether field, road, well, water or forest is included in the area of one village, still the inhabitants of that village have no right whatever, either of occupancy or of user, in any land except the fields for which they pay revenue, and any waste lands in which at the time of the survey rights of pastures were recognised. This remark of course only refers to khalsa villages, and does not relate to leased or alienated villages (izara or jaghir).

Maps.

81. The following maps are available:

1st.—The Indian Atlas sheet No. 55 on ¼ inch scale.

2nd.—The copies of the plane table sheets of the Topographical Survey on the scale of 1 inch=1 mile.

3rd.—The map of the Pusad Taluka prepared by the Revenue Survey of the Hyderabad Assigned Districts, on the scale of ½ inch=1 mile.

4th.—The village maps of the Revenue Survey and Assessment on the scale of 8 inches=1 mile.

5th.—The Revenue Survey map of 1877 on the scale of 4 miles to the inch.

These maps are sufficient for all present purposes.

Rock and soil.

82. The reserve consists of an undulating plateau, broken up by numerous valleys and ravines, and of a large extent of low land, situated along the river and in the principal valleys. On the plateau the rock is invariably 'trap,' and in many places there is a considerable extent of sheet rock close to the surface. On the low land near the river and ascending some distance up the main valleys is granite.

83. The largest of these valleys is the Korat valley. The Korat nala has a rocky bed and pools of water throughout the year. It rises on the borders of the reserve outside the western boundary. The width of this valley to a distance of 3 miles from the river is about 2 miles. Valleys and plateaux.

The valley next in size is the Gari valley, which rises in the centre of the reserve and joins the Penganga near the village of Gari. This valley is about half a mile wide in its lower course. Most of the other valleys are nothing but ravines, widening where they enter the low land. The largest extent of low land with deep soil is found near the main river,—one west of the deserted village of Dhanora, and the other south of Kharbi. The difference of level between the tableland and the low ground in the reserve is probably not more than 500 feet. The plateau with all its irregular indentations is bounded on all sides by steep and rocky slopes.

With the exception of these slopes and the heads of the ravines, the forest in this reserve bears unmistakeably the character of having either grown up on deserted fields, within a very recent period, or of having been subject to constant lopping, hacking and burning, in order to supply the requirements of the numerous villages which must at one time have existed on this area. Traces of old cultivation.

There seems little doubt that less than 50 years ago most of the villages the names of which are at present preserved were inhabited. The circumstances which caused them to be deserted are not known. The remains of three old tanks exist within the reserve, the bunds are broken, but might without difficulty be repaired. Near the site of the deserted village of Korat is a temple built of hewn stone.

85. The Penganga river and all stream-beds are fringed with fine specimens of kowah (*Terminalia Arjuna*), a few kosum (*Schleichera trijuga*), but with these exceptions there are very few large trees in the whole area, and those which exist are entirely confined to rocky slopes and the heads of ravines. On the plateau and slopes, where the rock is near the surface, Salei (*Boswellia thurifera*) is the most common tree, and fire protection without planting of other more valuable kinds will certainly have the effect of stocking large extents of ground with poles and saplings of this comparatively worthless tree. But where the soil is deeper and better, for instance near the edge of the plateau and on the low ground near the river, the growing stock is of a more satisfactory character. It is difficult to say which is the predominating tree here; *Anogeissus* (dhaura), *Terminalia tomentosa* (sadra), and *Diospyros Melanoxylon* (tendu) are probably those which are most generally distributed; while on soil suited to it *Soymida febrifuga* (rohin) and khair are common. With these trees are associated the ordinary trees of the mixed forest of this part of the country, of which the most valuable are teak and *Pterocarpus Marsupium*. Description of forest growth.

86. Teak is found scattered throughout the reserve both on the trap of the plateau and on the granite of the low land. Teak.

It is particularly common near the main river and on the edge of all minor streams. Teak has evidently, until a few years ago, been hacked and lopped more than any of the other trees. We did not see a single pole of decent shape, and most trees we saw, young or old, had all their branches covered with seed panicles. In a few cases only we noticed vigorous saplings with good terminal shoots. The present appearance of the teak in this reserve is not encouraging, but much of this must be ascribed to the treatment that these trees have hitherto received. Wherever teak trees are near, there is an abundance of young growth of teak, which under continued fire protection will doubtless make its way and will some day produce good timber.

87. Much more common than teak is *Ougeinia dalbergioides* (tewas); young growth is found almost everywhere and in places considerable areas are covered with saplings of this tree, while poles and small trees up to 3 feet in girth and 30 to 40 feet in height are not uncommon. This tree will doubtless be one of the most important kinds in the reserve. Bijasál (*Pterocarpus Marsupium*) occurs, scattered all over the reserve; we found a number of straight poles and small trees, and it seems to be inclined to grow well and to form straight stems. A large number of seedlings of it were noticed, and it is doubtless destined in future to furnish valuable produce from this forest. Of black wood we noticed a few small trees here and there. Bamboos (*Dendrocalamus* Tewas, bijasal and bamboos.

strictus) are found in most ravines, but they nowhere cover a large extent of country; the clumps are in isolated belts here and there.

Fire protection.

88. The demarcation of the reserve was completed in the hot weather of 1876, and during the same season the whole area of the reserve excepting 26 square miles was protected against fire.

Fire protection is effected chiefly by burning the boundary line wherever the reserve does not join the river; by burning a line on either side of the only two roads which are opened for cart traffic through the reserve, namely, the road from Kharbi to Bhawani *viâ* Darati, and the other from Kharbi *viâ* Gari and Bori to Umarkhed. The Penganga forms a complete natural protection, and where this river is the boundary it has not been found necessary to burn a line. Besides these main lines numerous subdivision lines are burnt. The chief of these is a line running from east to west from Kharbi to Morchandi, another from Gari across in a northerly direction to Darati, another *viâ* Korat from Darati to Gadoli, another from Darati *viâ* Korat to the boundary of Bhawani, another from Gari to Paroti bazurg, another from Bori to Paroti bazurg. As a rule these lines follow old village paths.

By these sub-divisional lines the reserve is at present divided into 15 blocks, which are isolated from one another, and besides these lines it is intended to connect the heads of all streams which are large enough to serve as natural fire lines with one another with the boundary line, or with fire paths, and thereby still further to increase the number of isolated blocks.

Probable effect of fire protection.

89. Fire protection is certainly the chief means for improving the condition of this reserve, and we must now consider how far that agency alone will have a satisfactory effect in improving the condition of the forest. Teak, bamboos, tewas, and bijasál will probably always command a ready sale, but it will be some time before the timber of any of the other trees can be sold at remunerative rates. There is no chance of any sale across the river into the Nizam's territory, nor any chance of export down the Penganga river, as the southern part of the Wún district is sufficiently supplied with wood, and there is no chance of competing with the forest resources of the Chanda district.

On the west side the reserve is bounded by a belt from 4 to 6 miles wide of hilly country with much wood, and its continuation is the range which divides the Pus river from the Penganga valley, a great portion of which is wooded.

Eventually we have no doubt, saj, dhaura, and lendya will find a ready sale, but we cannot take this eventuality into account as a certainty, and therefore our aim must be to stock the reserve as much as possible with an increased proportion of the more valuable kinds. What effect fire protection without the aid of planting and sowing will have weare able to judge by the present state of the forest. Since the villages above enumerated were deserted, large areas have become covered with saplings of saj, and, in places, of other trees, of which moka and tendu are the most remarkable. Besides these the only one of the more valuable kinds of which young growth is abundant is tewas. The spread of bamboos may, we believe, be left to nature, and so also the spread of tewas, which needs no assistance in this forest.

Cultivation of teak proposed.

90. As regards bijasál and teak it will be necessary to resort to artificial cultivation in order to increase their proportion, and we have without hesitation decided that, as a commencement, teak should have preference. The cultivation of teak has made some progress in the Melghát; subordinates are there available who have acquired the needful experience, and therefore we hope that the cultivation of teak may have a fair chance of success in this reserve. We therefore propose that for a series of years to come all work in this reserve apart from fire conservancy and general protection be concentrated on the cultivation of teak. In the Melghát, teak is cultivated according to two systems, —by transplants from nurseries, and by sowing in dug-up plots. The former system has been found the more successful of the two, provided the transplanting is done under the constant supervision of a competent officer during July and August.

Procedure proposed.

91. Considering the large extent of the southern division of Berar, we do not think that we could depend upon always having an officer available for this work, and we have therefore decided to recommend that the second plan be adopted, and this should be done in the following manner.

Plots, 12 inches square, about 3 feet apart, in continuous lines, should be dug up with a pickaxe, so that the ground is loosened to the depth of 9 inches. In each plot about 6 to 12 seeds should be sown in spring and lightly covered with earth to the depth of half an inch. The lines of these plots may be at a considerable distance apart, the distance being regulated by the character of the forest in which the plantation is made; they should nowhere be less than 10 feet apart, and on the low ground near the Penganga, where we propose that the first commencement should be made, the distance between the lines should be 30 or 33 feet. The lines should be staked out so as to be straight, and they should run from the river towards the hill. It is not proposed to cut down any trees or shrubs which may be on the lines or between them, and the distribution of the plots must be regulated accordingly. At the time of sowing it will be necessary to cut the grass along the entire length of the lines, and after the seed has been sown a layer of cut grass should be spread over the plots to facilitate germination and to prevent fresh grass springing up during the rains. Experience must shew whether these lines require clearing in subsequent years. Every effort must of course be made to stock the lines completely, and any plots which hereafter may be found blank should be re-sown. The seed to be used should be collected from mature trees, chiefly in the Wún district and in the Melghát.

The practice in Berar at present is, if possible, not to use seed less than one year old, as experience has shewn that fresh seed takes a longer time to germinate.

The cost of this operation will probably not exceed from 2 to 3 rupees per acre, and as further experience is gained it may be possible further to diminish the cost of this operation by having the plots at greater distances than 3 feet apart. But the commencement had best be made in the manner here indicated.

92. The area operated upon should be steadily increased annually, and there is no reason why the whole of the low land along the Penganga and in the Korat and other valleys should not be sown within the next ten years. **Area to be planted.**

We do not know what the area of the land now recommended to be operated upon will be, but we do not believe that it will exceed 10,000 acres.

The following areas will probably be found fit for planting:—

	Acres.
Dahili ...	1,500
Kowtha ...	400
Korat ...	3,000
Kati ...	450
Digras ...	700
Gadoli ...	400
Kharbi ...	800
Wargaon ...	1,500
Damsari ...	1,000
Yendi ...	1,000
TOTAL	10,750

These plantations should, at present, be confined to the valleys and the low ground near rivers, and they should be limited to localities where the soil is deep and good. This may possibly reduce the area above estimated.

In selecting the areas to be planted due attention should be paid to the growing stock and to the character of the soil. We do not recommend planting where the soil is a stiff binding loam, more suitable for sáj than teak, nor where the ground is cut up by ravines. Unless this operation is completed speedily the ground will be taken up by young growth of other kinds, and indeed it appears to us doubtful whether five or six years hence it will be possible to carry on the operation without clearing away the young growth of other kinds along the lines. It is therefore of great importance to lose no time in stocking with teak in the manner indicated as large a portion of the area as possible. We have said above that it would be desirable to complete the planting up of 10,000 acres within ten years, but we are well aware that during the first few years and until the work has come into full swing it will not be practicable to plant so large an area as 1,000 acres a year. We may be satisfied if 100 acres are planted the first, and twice that area the second year. Doubtless it would be

an advantage if these preparations could be extended to that portion of the forest on the plateau where the soil is deep and suitable. But at present we refrain from making any recommendations in this respect, as this must depend on the experience which will be gained in the operations now proposed by us in the valleys and on the low grounds.

Sub-division of reserve into blocks

93. It will be necessary at once to come to a distinct understanding regarding the division of this reserve into blocks and the permanent sub-division lines. It requires no argument that the chief sub-divisional lines must be those which will be most useful for the export of produce.

These, I understand, are the two roads already mentioned which lead from Kharbi *viâ* Darati and Bhowani to Amdapur, and the other from Kharbi *viâ* Gari and Paroti towards Umarkhed. Great attention should be paid to these two main lines, and they should be improved and straightened as much as possible. It will be understood that it is not at present intended to make any but fair weather roads along these lines.

Sub-division lines to follow the main export lines

94. The system of secondary lines should be so laid that they may in future serve as feeders to these main roads. The secondary lines will probably as a rule run up the chief valleys and ravines. But in some cases they will follow the spurs between two valleys. Along each road or sub-division line a clearance should be maintained at least 15 feet wide, wider of course along the two main lines mentioned.

These clearances will be necessary not only to facilitate export, but chiefly to facilitate fire protection. It may be considered premature in a forest so open as the Kinwat reserve to urge the keeping clear of straight lines, but it must be remembered that it is cheaper and easier to keep them clear now than to cut them through the forest when it has grown up. It should also be remembered that though on uneven ground the road cannot run straight, the clearances can be made to follow straight lines, and this should as far as possible be our aim from the beginning.

95. The plan here suggested of making the entire export lines serve to sub-divide the reserve into blocks may be objected to on two grounds :—

The old village areas cannot be formed into blocks.

First.—As already explained, the Revenue Survey Department has demarcated 26 village areas in this forest, and the lines separating them are demarcated on the ground by the Survey boundary marks, for the maintenance of which the Forest Department is responsible. The area of each village is known, and it may be urged that all we have to do is to accept them as the blocks or sub-divisions; this, however, would give us no assistance whatever in the management of the forest. The blocks thus formed would be neither homogeneous as regards soil and forest growth, nor would they be separated by straight lines, or by lines kept clear by traffic. There would be no advantage in maintaining these sub-divisions as blocks, and though it is convenient to have the detailed area statement which they furnish us, the old village areas cannot be used as forest blocks. For special purposes, however, such as to define the area within which grazing, cutting of grass, and the collection of minor produce may be permitted, it may be found useful to use the old village boundaries until the new system of blocks has been completely established.

The blocks cannot be formed so as to correspond with difference of soil and forest growth.

Second.—It may be urged that the blocks should be formed in accordance with the natural conditions which affect the forest growth, that for instance the plateaux should be treated separately and should be divided into a certain number of blocks, that other blocks should be formed of the low ground in the valleys. An examination of the forest will shew that this plan is impossible, and that it would lead to difficulties without any compensating advantages. The edge of the plateau and the limits of the low ground are defined by lines so irregular and broken that it would be impossible to use them as sub-divisional lines, and again on the plateau there are considerable areas of deep and excellent soil which will probably produce a forest which will grow up similar to that on the low ground. In the valleys again and on the low ground the division between good and deep soil, and places where the soil is poor and the rock close to the surface is most difficult to distinguish. If this plan were adopted the result would be blocks and compartments of the most irregular shape, and consequently most inconvenient to manage and withal by no means homogeneous as regards soil and forest growth. We should sacrifice the advantage of straight lines and would be obliged to maintain these irregular sub-divi-

sional lines at great expense, because they could never be kept clear by the export of forest produce. We have no hesitation, therefore, in saying that only lines which can be used for the export of forest produce should be selected as sub-division lines in this forest.

I cannot sufficiently urge upon the local officers the necessity of carefully studying the topography of the forest in this respect. Efforts should be made gradually so to organise the system of secondary fire lines that they may to some extent at least run along the lines which will, in future, be permanently maintained.

96. The only revenue hitherto realised from this forest has been by the sale of grass during the hot season to the villagers, chiefly on the south-western border. As a favour, and as a temporary measure, the three villages of Gari, Bori, and Therdi have been permitted to graze their cattle in the vicinity of the villages, against payment of grazing dues. The revenue realised from the sale of grass and of grazing dues was in 1875-76-77 Rs. 536, and in 1877-78 Rs. 287, giving a yearly average of Rs. 206. The cutting of grass is unobjectionable and should be continued as far as there is any demand. But it will probably be necessary to stop grazing until fire conservancy has been completely established and been maintained for a number of years. Nor is it intended to make any revenue at present from mohwa, chironji, or other minor produce, although eventually, after the necessity of fire protection has become fully recognised in the district, it may be possible to utilise these resources and to realise fair revenues from them. During the next five years we see no prospect of the reserve paying its way, but as the unreserved forests on its west side are becoming exhausted, a sufficient demand for wood, of sáj and other kinds, and for grass and minor produce, may be anticipated to cover the expenses of management. **Revenue realised.**

97. During the next five years we expect that the annual expenses of the forest will be as follows :— **Expenditure.**

I.—*Establishment.* This consists at present of one forest ranger on Rs. 50, one forester on Rs. 25, and five forest guards aggregating Rs. 51 per mensem. The outlay on salaries therefore amounts to Rs. 126 per mensem or Rs. 1,512 per annum, so that with contingencies the annual cost of the forest under B is Rs. 1,600. This is a strong establishment; but considering that we contemplate planting operations on a very large scale, it is necessary.

II.—The cost of *fire protection*, including the pay of watchers, who are generally entertained for about five months, is estimated at Rs. 350 per annum. This allowance will also provide for the cutting of sub-divisional lines and their maintenance, as well as that of the outer boundary. The annual outlay on plantations at the rate of Rs. 2-8 per acre will amount to Rs. 2,500 on an average. Thus, the total expenditure on this reserve, allowing about Rs. 350 for expenditure not specifically estimated, will not, it is supposed, exceed Rs. 5,000 per annum during the next ten years, *viz.* :—

	Rs.
Establishment	1,600
Conservancy and Works	3,400
TOTAL ...	5,000

PENGANGA RESERVE.

98. This forest was examined on the 17th, 18th, and 19th of February 1877. Its area is 11,939 acres. Demarcation was commenced early in 1874 and was completed in 1875. **Inspection Demarcation.**

99. The reserve consists of a portion of the areas of the following villages, situated outside the reserve, which are all inhabited :— **Villages.**

Panala	527 acres.
Pandorna	1,723 „
Marwari khurd	1,475 „
Manjarjúla	413 „
Satermal	2,085 „
Nandorá	2,513 „

Marwari bazurg	...	..	...	736	acres.
Janona ...	...	...	...	704	„
Argaon ...	...	...	...	472	„
Khandala ...	...	.	...	178	„
Hiwalni ..	..	...	...	1,113	„
		TOTAL	...	11,939	„

Maps.

100. The same descriptions of maps are available as for the Kinwat reserve.

Boundaries

101. The greater length of the boundary marches with occupied fields and in a few instances only with waste lands. Wherever it adjoins forest the line is cleared to a width of 40 feet. The boundary marks consist of heaps of stones about 3 feet high and 4 to 5 feet in diameter, with a post in the centre standing about 5 feet above the stones, to which are attached plates of tin bearing a serial number. These boundary marks are regarded as temporary, and they may suffice for the present, except that I should suggest the employment of shorter posts, standing only 2 feet above the stones.

Topographical features.

102. As regards the topographical features, the distinction between extensive level plateaux which occupy the highest parts of the forest, and numerous ramified valleys and ravines which occupy the remainder is at once apparent.

On the level plateau the rock is near the surface and parallel to it. There are in fact horizontal masses of trap rock covered by a layer of soil of varying thickness, but generally very shallow and covered by an abundance of large rounded stones. The most extensive of these plateaux are the Marwari plateau in the western part of the forest, and the Hiwalni and Argaon plateaux in its eastern part. But there are smaller areas of level plateaux in all parts of the forest. The area occupied by these plateaux may be roughly estimated at about 3,000 acres, the remaining 8,000 acres consisting of slopes, valleys, and ravines. In the valleys the soil is deep and to all appearances very favourable for forest growth.

Less favourable are the slopes and the heads of ravines where the ground is rocky. The rock is trap throughout.

Chief valleys

103. The following are the chief valleys :—

First.—The Pandorna valley, which rises near the village of Panala and passes through the western portion of the Pandorna block.

Second.—The Satermal valley in the south-western part of the reserve, which rises in the centre of the forest.

Third.—The Nandora valley with two streams, which join outside the reserve near the village of Nandora.

Fourth.—The Janona valley, which rises north of Hiwalni and with its feeders occupies the eastern corner of the reserve. The Janona, the Nandora, and the Pandorna nálas join and fall into the Pus river, while the stream which runs through the Satermal valley joins the Penganga river. There are no springs, and the pools in all streams are dry during the hot weather. We hope that continued fire conservancy will produce springs and considerably increase the supply of water in this reserve.

Forest on plateaux.

104. As regards vegetation this forest is open and incompletely stocked throughout. The plateaux with shallow soil must be considered separately from the rest.

On the plateaux the forest consists chiefly of salei, mixed with sáj and a small proportion of dhaura, char, and lendya. The trees are all stunted, with short stems and a flattish crown of numberless crooked branches. In its present state the average height of trees in this forest does not exceed 20 feet and is much less in places. Salei is here, as elsewhere, less affected by the shallow soil and the rock close to the surface, but even of this tree well-grown specimens are rare. A certain proportion of teak is found associated with the other trees, all stunted. Indeed, the teak is, if possible, even more stunted and crooked than the sáj, dhaura, and lendya, and yet on these plateaux what soil there is is good. Young growth of sáj is, here and there, making its appearance above the grass, and seedlings of teak dating from the time the fire con-

servancy commenced are abundant. Owing to the late rain which fell in this part of the country towards the end of January 1877, the seedlings of teak had all fresh leaves at the time of our visit and could therefore be readily distinguished. The grass on these plateaux is 3 feet high and in places very dense, but it does not appear to interfere with the growth of teak, seedlings having died or having been cut back to the root after they had sprung up.

Forest on slopes and in ravines.

105. On the slopes and near the heads of ravines the same kinds are found, with the addition of a large proportion of karai (*Sterculia urens*) and of *Euphorbia Nivulia*, which here attains a considerable size. In these places, although the soil is extremely rocky, the stature of the trees is much larger, and they have straight and often tall stems. Here teak is not uncommon and forms tall poles of good shape, the tops and branches of which, however, are full of seed panicles.

Forest in valleys.

106. In the valleys a great part of the ground was at one time under cultivation, and in such places the forest is poor and open, consisting chiefly of bir, palas, with a certain proportion of other trees, but very little teak. Higher up the valleys the forest is better and consists of the trees ordinarily found on trap in this part of the country.

Small trees of bijasál and blackwood are scattered here and there, but at present there is very little tewas. Teak is not uncommon, and poles 20 to 30 feet long are found; in most cases, however, poles, as well as old trees, terminate in a mass of seed panicles, and it was only in a few favoured localities that we found a number of poles with vigorously growing leaf-bearing leaders. This was particularly the case in the upper part of the Pandorna valley, where the soil is deep and moist, and which, as regards the vigorous growth of teak, sáj, and other trees, is the most valuable portion of the forest. It will be useful if the officer in charge will note and report whether the poles of teak now covered with terminal seed-panicles do not, under fire protection, throw out leaves instead. Isolated clumps of bamboos are found in several places.

Protection from fire.

107. The reserve has, with the exception of small areas, been protected against fire during the hot seasons of 1874 to 1878. The beneficial result of this measure is apparent throughout the forest. Young growth of sáj and other trees, the produce of long-suppressed stocks, is making its way through the grass everywhere, and it is most satisfactory to notice the marked and beneficial effect which fire conservancy has had, not only in multiplying teak seedlings, which are now abundantly found, but also upon the existing stock of coppice shoots. The terminal shoots were in many cases 3 feet long, and saplings which had sprung up since fire conservancy had commenced had attained a height of 12 to 15 feet. There is no doubt that under continued fire protection the forest will become rapidly stocked with young growth, and in most places a considerable portion of that growth will be teak. Most of the villages in the vicinity of the reserve are small and poor, but it is situated on the edge of a wide open plain containing many large towns, such as Ansing and Básim. It may truly be said that in this forest every stick that can be used for building purposes is saleable. There will therefore be no difficulty in favouring the growth of teak by thinning out trees of other kinds. Eventually, when the cultivation of teak in the Kinwat reserve has made progress, it may be considered whether, in some of the valleys of this reserve, teak might not advantageously be cultivated. But for the present the treatment of this reserve will be exceedingly simple; it will consist in fire protection, and afterwards in thinning out less valuable kinds in order to further the production of teak, bijasál, tewas, and bamboos. The earliest attempt at planting should be made with bamboos in the vicinity of streams, and on moist and deep ground.

Future sources of revenue.

108. It will in every respect be premature to form an estimate of the future crop in this forest. But we must guard against sanguine expectations as regards the plateaux. Teak will doubtless increase, but the most favourable result that we have a right to expect will be small poles 15 to 20 feet long. Even these, however, will be valuable, and the difficulty will doubtless eventually be what to do with the old but stunted trees of salei, sáj, and other kinds. Very few of these trees will yield any wood fit for building purposes, and the demand for firewood will probably not suffice to utilise the crooked stems and the great mass of branches of which they consist. The new main road from Pusad to Básim will pass through the centre of the reserve and will facilitate the export

of firewood, but even at Básim the demand for firewood is small. In this part of Berar fields are not ordinarily fenced in, but this may be due to some extent to the scarcity of material for fencing, but at present there is no demand for that purpose. Unless a new demand for small wood springs up, the manufacture of charcoal seems to be the only mode of disposing of this material. This, however, must be left for further consideration.

Blocks.

109. As regards the sub-division of the forest into blocks, it will suffice here to state what was explained at full length in discussing the Kinwat reserve, that it will be impracticable to form the area occupied by plateaux and valleys into separate blocks, and that it will be equally useless to adopt for this purpose the lines which separate the village areas from each other.

Sub-divisional lines should be so selected as to serve as export lines.

110. Here, as in other reserves, the leading principle must be so to select all sub-divisional lines that they may afterwards be used for the export of produce from the forest. In the present case the chief export line will probably be the new road from Pusad to Básim, which, as already stated, passes through the forest, and the export by that road will chiefly be towards the west. But it is not impossible that local export may spring up, eastward towards Pusad and southward towards the Penganga valley. It will suffice here to state that the question of the most useful export lines should be carefully studied in selecting permanent sub-division lines. The existing sub-division lines which are mainly kept clear for the purpose of fire conservancy run along existing roads and paths, and they should be maintained for the present; besides these, however, other lines are burnt, not following any existing paths, in order to connect streams or other sub-division lines, and thus to increase the number of isolated blocks. These lines are useful for fire protection, but I would urge that as much as possible the same lines may be burnt every year. Regarding the blocks into which the forest should be permanently divided it would be premature to offer any suggestions at present, and it may be convenient for some time to use the existing village areas as blocks, but this must be only provisional.

Grazing of Panala village.

111. Before the forest was demarcated the village of Panala was given the right to graze by the Revenue Survey Department in the block called after that village which forms the north-western corner of the reserve. They exercise this right, however, only near the edge on the west side, and do not send their herds down into the Pandorna valley. Hitherto, it has been possible to protect this part of the forest against fire, though of course it would be the interest of the village to burn the grass to obtain fresh pasture, but the risk is great and it will be much better to come to an understanding with the village, and if necessary to exclude a portion of the area from the reserve, so as to free the remainder from grazing rights. On the area thus excluded the people of the village would have the right of firewood free; they may therefore, perhaps, be satisfied with an area less than the entire block, which measures 527 acres.*

Grazing of Marwari village

112. The village of Marwari received no grazing rights at the time of settlement, and as nearly all waste land in their vicinity has been included in the reserve, it was thought desirable to permit them to graze their cattle, on payment of grazing fees, in the jungle adjoining their village. On my inspection I came across a part of the forest grazed over by these people in which a fire had occurred during the hot season of 1876 and done great damage. Such fires are probably always lighted by the people who graze their cattle within the reserve, and therefore it is necessary to localise the permission to pasture which has been granted to this village.†

Financial results.

113. The revenue and expenditure have been as follows:—

	Receipts.	Charges.	Surplus.
	Rs.	Rs.	Rs.
1873-74	575	259	316
1874-75	950	793	157
1875-76	879	984	105 Deficit.
1876-77	391	902	511 „
1877-78	332	1,019	687 „

The revenue realised during this time consisted chiefly of the sale of wood, principally of teak poles cut for the requirements of European officers at Básim

* This suggestion has already been given effect to, and a portion of the land excluded altogether in commutation of the grazing right over the whole block.

† It has since been found preferable to exclude a small portion of grazing land containing chiefly salai, and to give this up entirely to the village for grazing.

and Hingoli. The amount realised from the sale of grass was under Rs. 100 per annum.

114. The financial prospects of the Penganga reserve during the next few years are not satisfactory. Grass should be sold as much as possible, but we do not anticipate a greater revenue than Rs. 100 per annum from grass. Sums similar to those realised in the last three preceding years might be obtained from the cutting of teak; this, however, we would oppose, as nearly all trees in this reserve are seed-bearing, and it is desirable to maintain as many seed-bearing teak trees on the ground as possible; nor do we at present advocate the thinning out of trees of other kinds, as the cover furnished by them will tend to diminish the grass in the reserve and consequently the risk of fires. A few years hence, however, it will doubtless be advisable to cut over all badly grown teak and thin out large trees of other kinds. The commencement of these operations must depend on further experience. **Financial prospects.**

The expenditure on account of this reserve is on account of salaries Rs. 56 per mensem, or Rs. 672 per annum; fire conservancy Rs. 200; repairs to thanahs, purchase of tools and contingencies, Rs. 128: total Rs. 1,000. This forest, therefore, will, for several years, cause a net expenditure of about Rs. 900 per annum.

Ghatbori Reserve.

115. This reserve was finally demarcated in 1874. It consists of four blocks, situated on the edge of the ghâts which overlook the plains of Berar. **Area.**

The area of these blocks is as follows:—

	Acres.
Wagdeo block	6,299
Rajgad block	7,959
Batchwadi block	7,081
Untersangi block	2,636
Total ...	23,975

We visited portions of the three last-named blocks on the 23rd of February. These blocks are separated by three valleys which may be designated as the Borúd, Pandorna, and Wusli valleys; and the reserves thus extend from the top down to the foot of the ghâts. The rock is trap throughout and in many places it is close under the surface.

116. The maps available are as follows:— **Maps, and boundaries.**

First.—The Indian Atlas sheet No. 55 on the ¼-inch scale.

Second.—Sheet No. 2 of the Hyderabad Survey of 1843-44 on the 1-inch scale.

Third.—The map of the Chikli talúk prepared by the Revenue Survey of the Hyderabad Assigned Districts on the scale of 2 miles to the inch.

Fourth.—The village map of the Revenue Survey on the scale of 8 inches = 1 mile.

Fifth.—The Revenue Survey map of 1877 on the scale of 4 miles to the inch.

The boundaries of these reserves march with cultivated and occupied lands and with unreserved forest. In the latter case the line is cleared to a width of 40 feet. The boundary marks are similar to those by which the Penganga reserve is demarcated.

117. The vegetation is similar to that of the Penganga reserve, but we noticed no bijasál, no blackwood, and very little tewas. **Character of forest.**

The growth of teak, however, is better than in the Penganga reserve. We also noticed poles of teak of good shape and size outside the reserve in several valleys both above and below the ghâts, and near the village of Ghâtbori there is a considerable extent of well-stocked teak coppice both on private lands and on Government waste.

A remarkable fact is that in most villages of South Berar, chiefly in those near the ghâts, the custom of using large solid wheels made of three pieces of teak still exists. The wheels are from 3 to 4 feet in diameter, and they cost at the fairs held at the foot of the hills from 50 to 100 rupees a pair. The wood is

at present imported from Nagpur and the Melghát, but I have no doubt that it formerly was produced in those forests, and on further search the traces of former teak forests will probably be found in some of the valleys in the vicinity of the Ghátbori reserve. The use of these solid wheels always indicates a country in which formerly timber of large size was procurable. These wheels in South Berar are always made of teak.

Anjan (*Hardwickia binata*) is found in the Wagdeo block. A few isolated bamboo clumps are found in the ravines.

The forest is open throughout, and on the plateaux the trees are short and stunted.

Protection from fire and pasture.

118. Protection from fire was commenced in the hot season of 1874, and the greater part of these blocks has been protected for three consecutive hot seasons.* But success in this respect has only been partial. The great difficulty hitherto experienced in the protection of these reserves is the fact that they are surrounded by large villages who have large herds of cattle, and that the cattle of distant villages, as well as of Brinjaras, have been in the habit of grazing in these forests. The conclusion which I have formed after examining the country in the vicinity of the Ghátbori blocks was that the unreserved forests contained large areas of grazing ground, and that as regards pasture these villages were infinitely better off than the villages in South Berar between Ansing and Buldana, and between Ghátbori and Lonar. But it is probable that these villages, being in the vicinity of large grazing grounds, have larger herds, or can for other reasons not conveniently make arrangements for dispensing with forest pasture. It is a fact that the greater portion of the hills which surround the reserves on all sides are so much grazed that they are perfectly bare. But, as already mentioned, this is not only the work of the village cattle; there are numerous Brinjaras with their herds, and other villages also below the base of the hills send their cattle there to graze.

Appearance of the grass. Cattle pounded.

119. The appearance of the grass in the blocks visited by us is quite different to the grass in the Penganga and Kinwat reserves. One cause is that a great deal more grass has been sold here, but we also came across large areas which had been completely grazed down. The following list of cattle pounded between June 1876 and January 1877 will shew the difficulties experienced in protecting this forest:—

		Number of cattle.
June	1876 ...	30
July	„ ...	174
August	„ ...	17
October	„ ...	517
November	„ ...	459
December	„ ...	128
January	1877 ...	49
	TOTAL ...	1,374

The fees which the people have to pay amount to 8 annas per buffalo, 4 annas per bullock, and 2 annas per calf. Yet the villagers drive their cattle over and over again into the forest at the risk of paying these fees. Attempts have been made to prosecute for setting fire to the grass in the reserve, but hitherto without success, as it is extremely difficult to prove the action of setting fire to the forest.

Protection must be made more efficient.

120. I am of opinion that where these blocks adjoin cultivation it will be a great advantage to make it difficult for cattle to enter and leave the reserve by heaping up thorns, branches, stones, and other impediments along the boundary line. This will have the further advantage of demarcating the outer boundary of the forest by a continuous and unmistakeable line. But the only efficient way of enforcing the protection of this reserve is to strengthen the establishment during a number of years, and for the divisional officer to spend as much time as possible in the immediate vicinity of these blocks.

Similar difficulties were experienced when the Katowla block of the Bijeragogarh reserve in the Central Provinces was first closed. Attempts were at that time made to fence it, and over a large extent of boundary line a good

* In 1877 almost the whole was protected, but in 1878 very nearly two-thirds of the forest was burnt.

fence is now growing, but strict protection, continued for a couple of years, had the desired effect, and the fence is now no longer necessary.

121. The sale of grass ought to be extended as much as possible, and it is hoped that in this manner the fodder requirements of the villages in the vicinity will be sufficiently met without detriment to the forest. The management of these blocks will be extremely simple; the forest is so open that no wood should be cut for a long time to come. All that requires to be done here therefore is to protect it against pasture and fire, and to sell as much grass as possible. It might be urged that the safest way to prevent fires would be to allow the reserve to be grazed over. But this expedient would effectually prevent young growth and make the regeneration of the forest impossible. **Management.**

122. Regarding the sub-divisional lines it will be best to say a few words with reference to each block separately. The Untersaongi block is sub-divided by two lines, one following the path from Untersaongi to Raygaon, and the other from Raygaon to Borúd. These lines are suitable for the present. In the Batchwadi block the sub-division lines run along the road from Bailgaon to Pandorna and along several other roads in the southern part of the reserve, and it is contemplated to add several sub-divisional lines joining the heads of valleys in the northern part of this block. In the Rajgad block there are three roads running from Chickelval and Pipperdoli and other villages below ghát, to Iswee and other places above ghát. These roads will eventually form the best export lines for forest produce from this block. **Blocks and sub-divisional lines.**

They have already been selected as sub-division lines and should be continued as such. The Wagdeo block is divided into two portions by the main road from Ghátbori to Wagdeo, which is well frequented and is maintained as a sub-divisional line.

Thus the principle which has been urged in the case of all other reserves will here also find application, namely, that the sub-divisional lines of these reserves should, as much as possible, be laid along the chief export lines.

123. The revenue and expenditure from these blocks has been as follows :— **Revenue.**

	Receipts.	Charges.	Deficit.
	Rs.	Rs.	Rs.
1873-74	410	543	103
1874-75	448	968	520
1875-76	530	806	276
1876-77	539	1,240	701
1877-78	572	1,324	752

The chief items have been sale of wood cut on the boundaries and sale of grass. By sale of grass it is expected that Rs. 800 will be realised during the current year.

124. The expenditure for the future may be estimated as follows :— **Expenditure**

	Rs.
Fire conservancy	250
Repairs to thanahs, tools and contingencies	110
TOTAL ...	360

125. Establishment Rs. 70 per mensem (one forester on Rs. 35 and 3 forest guards on Rs. 15, 12, and 8 per mensem) or Rs. 840 per annum; total Rs. 1,200 per annum. The permanent establishment entertained for this reserve is out of all proportion weak, if compared with that sanctioned for the other reserves of South Berar. **Establishment.**

For the Penganga reserve, for instance, forming a compact block of 11,939 acres, there is one forester and three forest guards, costing in the aggregate Rs. 56, while Ghàtbori not only has more than double the area, but it is separated into four distinct blocks. If a monthly outlay of Rs. 56 is considered necessary for the Penganga reserve, an outlay of four times that amount would be requisite for the protection of Ghátbori; and I am inclined to think that one reason of the imperfect success which has hitherto attended the protection of Ghátbori must be sought in the insufficient local establishment assigned to it.

126. Eventually this forest will yield a very much larger revenue than the Penganga reserve, as there is a market for its produce both above and below **Suggestions.**

the ghâts. The demand for firewood and grass is also sure to be larger than in the Penganga reserve.

It is therefore well worth while to consider the measures requisite to make protection of this forest efficient; and I would suggest that a re-distribution of the establishment, with the view of effecting this end, be taken into consideration.*

The figures quoted above will shew that the Ghâtbori blocks will not at once pay their way; but it may be regarded as certain that it will not be long ere the revenue equals the expenditure, even with a largely increased establishment.

GARU-MATTERGAON RESERVE.

Inspection.

127. We examined this forest on the 27th and 28th of February and the 1st of March 1877.

Situation.

It is situated on the edge of the ghâts between Buldána and Garu-Mattergaon. It is a compact block about 12 miles long and from 6 to 8 miles broad. The area is 46,525 acres.

Boundaries.

128. The boundaries march in most places with unreserved forest, much of which, however, has lately been brought under cultivation.

Wherever other forest adjoins it, a line 40 feet broad has been cleared, and the usual temporary boundary marks, heaps of stones, bearing a serial tin number affixed, have been erected at all angles and at convenient distances.

Area.

129. The area of the land included within the reserve consists of the waste lands of the following villages:—

No.	NAMES.	Acres.	Guntas.
	INHABITED VILLAGES.		
1	Mattergaon	946	4
2	Boarkhaida	3,564	32
3	Warrawand	982	3
4	Borala	6,769	21
5	Boatha	3,480	2
6	Kowdgaon	185	...
7	Bauthola	20	...
8	Karrawand	4,045	31
9	Takurkhaida	252	...
10	Urni	2,458	9
11	Nagjéri	105	...
12	Joadgah	508	...
	DESERTED VILLAGES.		
13	Thar	590	7
14	Davari	3,883	39
15	Palásdug	6,551	28
16	Garu	440	...
17	Kherdi	362	...
18	Mathni	747	16
19	Chichkhaida	1,264	15
20	Madari	1,794	18
21	Gillori	55	...
22	Tharapur	150	...
23	Pipperkhaida	320	...
24	Gaondunkhaida	784	24
25	Waki	615	33
26	Garpeth	2,939	31
27	Goradi	2,710	3
	TOTAL ...	46,529	36

Of the inhabited villages the following are above ghât:—Warrawand, Borala, Bauthola, Karrawand, Takurkhaida, Urni, Nagjéri, and Joadgah. The remainder

* Since the above was written 4 guards on Rs. 8 each have been added to the Ghâtbori establishment.

are in the valleys and below ghát; Boarkhaida in the valley of the same name; Kowdgaon in the Chinchkhaida valley; Boatha in the valley of that name; and Mattergaon in the valley of the Ghan river.

130. The following maps are available :— **Maps.**

First.—The Indian Atlas Sheet No. 55 on ¼-inch scale.

Second.—Sheet No. 2 of the old Hyderabad Survey, 1843-44 (Maiker Circar), on the 1-inch scale.

Third.—The map of the Chickli taluk prepared by the Revenue Survey of the Hyderabad Assigned Districts on the scale of 2 miles to the inch.

Fourth.—The village maps of the Revenue Survey on the scale of 8 inches to the mile.

Fifth.—The Revenue Survey map of 1877 on the scale of 4 miles = 1 inch.

These maps are sufficient for all present purposes, but it will be necessary to make a survey of the boundary line and of the chief sub-divisional lines, in order to enter the same correctly on the 1-inch scale maps of the Hyderabad Survey.

131. South of the reserve extends the tableland of the Buldána district, which, save where it is cut up by ravines, is almost level and is studded with large villages. A few years ago there was a belt of forest outside what is now the boundary line in this direction, but this has almost all been cleared and brought under cultivation. The average of this tableland is about 2,000 feet. Only a small portion of it is included within the boundaries. The chief portion of the reserve consists of narrow plateaux and ridges very much cut up by ravines and valleys which intervene between these stretches of high land. The whole area is extremely broken up by these valleys and the ravines which join them. The largest continuous piece of tableland within the reserve is that which may be designated as the Ganesh Chauki tableland, which extends from west to east, north of the Ghan river, and is nearly 7 miles long with an average width of 1½ miles. Towards the west this tableland is connected by a narrow ridge with that portion of the Buldána tableland on which the village of Bauthola is situated. **Tablelands and plateaux.**

Another considerable area of high land stretches from north to south between the Shewli nála on the west and the Takurkhaida nála on the east. The length is about 3½ miles and its average width about 1 mile. But, as was said before, the area of the reserve chiefly consists of broken ground along the valleys, and its topography therefore will best be understood by enumerating the principal valleys.

The reserve is drained by two tributaries of the Púrna river, which we will designate as the Badnera and Ghan rivers. The former joins the Púrna north-east of Mulkapur, and the latter north of Nandora. The head of the Badnera river which we designate as the Boarkhaida nála rises near Buldána and forms the boundary of the reserve from its westernmost corner to near Jharapur village for a length of nearly 5 miles. The feeders of this nála drain the west side of the Ganesh Chauki plateau. The Ghan river rises near Bauthola village, and after running in an easterly direction south of the Ganesh Chauki plateau, leaves the reserve near Garu-Mattergaon. From the south this river receives two great feeders, one of which we call Shewli and the other Takurkhaida nála.

The two feeders of the Nandora nadi rise in the reserve above the villages of Chinchkhaida and Boatha.

132. Inside the reserve there is only a small area of level ground in the valleys, and this is found chiefly in three places: namely, in the valley of the Boarkhaida river near Pallásdug; at the head of the Chinchkhaida valley, a fine bay about 2 miles long and 1 mile wide; and in the valley of the Ghan river above Garú-mattergaon. There is also a narrow strip along the Boatha nála. **Level ground within the reserve.**

These places are certainly the most valuable portions of the reserve. The soil is deep and rich. Every effort must be made to protect the forest in these valleys against fires and grazing, and regular annual reports regarding the young growth coming up in these places should be submitted by the divisional officer. They are well stocked with anjan and in places with teak. There is, however, in the ravines and side valleys a considerable extent of rich deep soil, which probably in the aggregate will be found to occupy a considerable area.

Rock and soil.

133. The rock is trap throughout, frequently vesicular, and with numerous veins of quartz and limestone. It disintegrates readily, and the soil is more gravelly and lighter than the soil which is usually found on this rock.

In several places we noticed a considerable extent of red soil, and deposits of laterite will probably be found. On the tablelands the rock is near the surface, but the soil is much deeper than is the case on the plateaux in the Penganga reserve.

Water supply in the reserve.

134. No springs are known in the reserve. The Ghan river has pools of water throughout the hot season, but most of the other streams are dry. At the time of our visit there were pools of water in many places, owing to the heavy rains of January and February.

Character of forest.

135. The most important tree in this reserve is anjan, *Hardwickia binata*. In South Berar this tree is found along the edge of the gháts from Buldána to Ghátbori. On the plateau it is found to a distance of about 5 miles from the upper edge of the gháts, and it is found on the spurs and outlying hills at the foot of the gháts. About 70 years ago, after the wars which devastated this country, Mattergaon and the surrounding lands must have been covered with a splendid and almost pure forest of this tree. And some of the valleys which are outside the boundaries of the reserve, such as the lower part of the Boatha valley, doubtless in those days produced large timbers of anjan. Even now the fields and grazing grounds which occupy this and similar valleys outside the reserve present at a distance the appearance of an anjan forest. The gradual extension of cultivation has been the main cause of the destruction of this forest. But much timber has also been exported to the open country of the Púrna valley. During the construction of the railway this forest yielded timber, firewood, and charcoal on a large scale.

Growth of anjan in the forest.

136. The anjan trees with which the forest and the country surrounding it are at present stocked, are of two descriptions :—

First.—Old trunks, often of considerable girth, generally short, but not more than 10 feet long, bearing the marks of having constantly been pollarded. These old stems have now thrown up heads of branches and are valuable as seed-producers, but cannot be expected to be of any great importance for the production of timber.

Second.—Young trees,—that is, poles and saplings. It is a very common thing to notice short stems from 6 to 12 inches in diameter, which apparently were cut 10 to 15 years ago, and which have thrown out one or several poles. These shoots from younger stems we noticed were almost always straight, while the branches produced by old pollard stems were mostly crooked and irregular. The trees of both classes have full foliage, which, on account of the drooping branches, has a light and very elegant appearance. The colour of the fresh foliage is a greyish green, but we noticed, chiefly on slopes and near the edge of the gháts, a large proportion of anjan trees losing their leaves. Before falling, the leaves turn into a light yellow colour. We also noticed trees with young foliage, which is usually red. Both young and old trees were covered with seed in the valleys and the lower part of the forest below ghát. The pods were fully formed, but they do not ripen until the end of March. The trees are bare of leaves in the latter end of April and get their new leaves almost immediately afterwards. During the year 1877-78 anjan has seeded generally throughout the reserve; this is the first recorded instance of a general seeding of anjan.

Other trees.

137. Associated with anjan are the trees usually found in the mixed forests of these hills, the chief being sál, dhaura, and lendya. Teak is more common in the western part of the forest, and in some ravines we noticed poles of promising size and shape. A remarkable feature of these forests is that in certain tracts teak, solai, and khair are found in large numbers together. Tewas is wanting, and bijasál and blackwood are scarce.

In some of the valleys large specimens of mowha were noticed.

Taking the forest as a whole, it may be described as exceedingly open and incompletely stocked. The trees do not, as a rule, exceed 30 feet in height, and the ground is covered with grass. On account of the scanty rains of 1876 the grass in this reserve was unusually small, but excepting in low places it never exceeds 3 feet in height.

138. On the plateau along the southern edge of the reserve a belt between 1 and 2 miles in width within the reserve is completely grazed down by the cattle of the large villages around it. But further inside and near the lower edge the grass is fairly well protected. **Grass grazed down by cattle.**

139. The reserve has been protected from fire during the hot seasons of the years 1874 to 1878 inclusive. We noticed two areas burnt on both sides of the Ghan river, aggregating about 1,000 acres; both had been fired this season, one by people whose cattle had been pounded, and the other through want of care in burning a fire-line. But, upon the whole, fire protection has been successful, and its beneficial effect is visible everywhere. **Protection from fire.**

140. Young growth of anjan, consisting of old roots or stocks under ground, producing one or several shoots every year, which were formerly killed by the annual fires have now developed without check, and there seems ground to hope that at no very distant period the young growth of anjan will overtop the grass. All seedlings, however, which we found had originally sprung up before conservancy was attempted, and we searched in vain for seedlings which had sprung during the last three years. The seeding of this tree, however, is somewhat uncertain; for instance, in 1877 no seed could be found above ghát, and years have been known in which no seed at all was produced. In 1878, however, as already stated, a general seeding has taken place. **Young growth of anjan.**

There is every reason to suppose that fresh seedlings will now make their appearance, and it may confidently be expected that the growing stock of anjan in this forest will thus be considerably increased.

141. We do not at present recommend any attempts to cultivate anjan in this forest. This must wait until it is seen how far continued protection from fire and cattle will have the effect of producing seedlings, and thus increase the growing stock on the ground. From experiments made by Mr. Drysdale it is known that anjan seed germinates readily; it has been raised without difficulty at Buldána and other places, and there is no reason to apprehend any difficulty in cultivating it on a large scale. Nevertheless it seems to me necessary that before any decision is come to on the subject, experimental plantations on a small scale should be established to afford ample opportunities for studying the growth and requirements of the tree. **Cultivation of anjan not proposed at present.**

The South Berar Forest Division, as at present constituted, is far too extensive to render the establishment of a forest garden in this reserve advisable. The locality, therefore, where these experiments of anjan shall be made must be left for further consideration. It will suffice to say so much that no forest garden should be established unless permanent and competent supervision is available.

142. The chief difficulty in the management of this reserve is the protection against the cattle belonging to the large villages situated on the open country of the Buldána plateau. The following statement shews the cultivated area and the area available for grazing, together with the number of cattle of all villages bordering on the reserve above ghát:— **Protection against grazing.**

Name of Village.	Number of houses.	Number of cattle.	Occupied and cultivated land.	Waste Lands.			Remarks.
				Free grazing.	Sold by auction.	Total of waste lands.	
			Acres.	Acres.	Acres.	Acres.	
Joadgah ...	14	129	716	481	1,432	1,913	
Nagjeri ...	14	32	818	307	509	816	
Urni ...	71	417	1,841	262	746	1,008	
Takurkhaida ...	81	432	1,569	444	74	518	
Karrawand ...	130	800	4,552	94	916	1,010	* 408 acres 22 gts. were excluded from the reserve in January 1878, and added to the free grazing of the village of Warrawand. The total acreage of free grazing of this village is now 653 acres 22 gts.
Dongar Saoli ...	140	1,300	3,701	257	456	713	
Warrawand* ...	186	1,700	3,545	245	3	248	
Bauthola ...	305	1,300	3,394	218	926	1,144	
Khandalla ...	143	1,100	2,179	179	. .	179	
Borala	3	25	216	29	408	437	

From this statement it will be noticed that two villages, Warrawand with 1,700 cattle and Khandalla with 1,100 cattle, have only 248 and 179 acres of grazing ground respectively. They had a much larger area formerly, but it has all been brought under cultivation during the last few years' and hence difficulties are felt.

Cattle pounded in 1876.

143. During the current year the following cattle have been pounded :—

Month	Heads of cattle.	Fees levied.		
		Rs.	A.	P.
April 1876	1	0	8	0
May "	81	6	12	0
June "	27	5	4	6
July "	1,705	151	4	0
August "	831	135	0	0
September "	313	77	2	0
November "	419	110	4	0
December "	343	79	8	0
Total ...	3,670	565	10	6

This is not a satisfactory state of things, especially when it is considered that in spite of the vigilance of the Forest Officers a very large portion of the grass forest is grazed over constantly, and generally at night.

It is certainly necessary that during the next few years the divisional officer should spend several months in each year in this and the Ghátbori reserve. In accordance with our suggestions regarding plantations in Kinwat, his presence in that forest will chiefly be required in March and April, and he will therefore be able to devote June, July, and August to Ghátbori and Garu-Mattergaon, and these are the worst months for grazing.

Rectification of boundary proposed.

144. But in addition to a more efficient supervision it would be most desirable to remove as much as possible any actual difficulties experienced by these villages in providing themselves with grazing, and I would therefore suggest that the southern boundary of the reserve be revised so as to exclude a few hundred acres of grazing ground for the use of those villages which stand most in need of it. This grazing land, however, should be given up on condition that it be not broken up for cultivation.* It may not be out of place here to mention that the numerous and large villages of the open country of South Berar, which extends from Buldána to Ansing, over a length of about 80 miles, with a width of from 20 to 25 miles, that all these villages, I say, maintain large herds of cattle with hardly any forest pasture. The cattle of these villages are fed on karbi, sorghum, vulgare and cotton seed, and they graze on waste lands and fields set apart for the production of grass; nor must it be forgotten that the best breed of cattle in Berar is not to be found in villages near the edge of the ghâts, where forest pasturage is plentiful, but rather in the open country of the Púrna valley, where there is no forest pasture at all. I have heard it stated that the villages near the ghâts keep larger herds of cattle and on that account require larger areas of grazing ground. I do not know how far this statement is correct, but if so it is possible that the herds kept by them are in excess of the fodder which they can afford to give them. At all events the aggregate area of the Ghátbori and Garu-Mattergaon reserves which has been withdrawn from pasture is only a small proportion of the total area of the hills which is available for grazing.

Chief sub-divisional lines.

145. The chief sub-divisional line in this forest is the main road from Buldána to Kamgaon, which runs through the forest from south-west to north-east.

On this road in the centre of the forest is the police chauki of Ganesh, situated on an isolated peak which rises from the plateau previously described.

This point commands a view of a large portion of the reserve nearly 4 miles in diameter, and it is thus a most important point which should be fully utilised for the protection of the forest.

* Such land has been allotted during 1877-78.

Several sub-divisional lines radiate from this point following paths leading to villages on the outside of the reserve. The chief of these are the line to Boarkhaida, Chichkhaida, and to Borala. Other sub-divisional lines are cleared and burnt annually along existing paths which run in various directions in different parts of the reserve, and the selection of these sub-divisional lines seems on the whole to have been judicious.

Here, as in the other reserves, I cannot sufficiently impress it upon the officers entrusted with their management that the sub-divisional lines must be permanent and should always follow those lines which eventually will be used for the export of forest produce.

146. In several places I noticed the traces of old cart roads. These lines should be carefully examined and not be neglected; they will eventually be found exceedingly useful. **Old cart roads.**

As the management of the reserve will for many years be entirely limited to protection, it will not be now necessary to discuss the formation of blocks.

147. The revenue and expenditure on account of this reserve has been as follows :— **Revenue and expenditure.**

Year.	Revenue.	Expenditure.
	Rs.	Rs.
1873-74	882	1,476
1874-75	434	1,614
1875-76	578	1,632
1876-77	181	1,533
1877-78	893	1,803

During the current year Rs. 300 is expected to be realised by the sale of grass.

The large revenue of 1873-74 was due to the wood cut on the boundary lines which was sold.

The revenue from grass is in my opinion capable of considerable development.

The ground, it is true, is more broken than in many parts of Ghátbori; nevertheless I feel assured that there have been cart roads all over the reserve formerly, and where they may not be practicable for carts, bullocks and donkeys can and will doubtless be used. I should say that the revenue from this source ought to be considerably increased, and the greater sale of grass will have this advantage, that it will to some extent relieve the difficulties complained of by the villages adjoining the reserve.

148. The expenditure will in future consist of the following main items :— **Future expenditure.**

1 Forest ranger on Rs. 60 per mensem, 3 forest guards on Rs. 15, 12, and 8, amounting to Rs. 76 per mensem or Rs. 1,140 per annum. *

Comparing this establishment with that entertained for the Kinwat and Penganga reserves, it undoubtedly is weak and hardly sufficient at present as long as the grazing difficulty exists.

149. I find that the ranger is located at a small village of Boarkhaida on the north-west side of the reserve. Nominally his head-quarters are at the Police chauki of Ganesh, but as there is no water there he is allowed to live at the place mentioned. The forest guards are located at the villages of Mattergaon, Boatha below ghát, and Karrawand above ghát. The location of this establishment should be so far modified as to place the ranger and at least one forest guard above ghát, where the difficulties are greatest. I understand that the ranger was formerly located at Bauthola, and that this was found not to answer. I should suggest that another trial be made, and that he be located in one of the villages close to the reserve, the cattle of which chiefly trespass inside it.† The cost of fire protection is estimated at Rs. 300, which, with Rs. 160 for contingencies, will bring the estimated expenditure of this reserve up to Rs. 1,600 per annum. **Distribution of the local establishment.**

* This establishment has since been increased by the appointment of 3 more guards on a monthly pay of Rs. 8, making a monthly total of Rs. 1,200 per annum.

† His head-quarters have lately been removed from Boarkhaida below ghàt to Warrawand above ghât.

CHAPTER IV.

ON PROTECTED FORESTS AND DISTRICT RESERVES.

Introduction.

150. The following remarks relate only to those districts to which the operations of the Survey and Settlement Departments have been extended; they do not relate to the forest of the Melghát, which has been treated in a separate chapter.

Under the operations of the Revenue Survey the waste lands, whether culturable or unculturable, have generally been divided into two classes. In the Survey numbers of the first class the rights of free grazing have been granted to the village, while in the Survey numbers of the second class no such right has been given. The lands of the first class are generally known as free grazing numbers, while those of the second class are designated as waste numbers. These latter may, again, be sub-divided into waste culturable or '*pareet*' numbers, and waste unculturable or '*parampok*' numbers.

Cutting of wood. Reserved trees.

151. With regard to the cutting of wood the following rules exist: There are twelve kinds of reserved trees, notified in March 1874—teak, shisham (blackwood), bijasál, tewas, anjan, tamarind, ním, mohwa, chironji, pipal, mango. Bamboos are also reserved, but none are found in these forests except in the Wún district. The reserved kinds may only be cut under orders from the Deputy Commissioner, or any of his subordinates whom he may authorise to give permission. The rates at which these reserved woods may be sold are fixed for the whole province. The unreserved kinds may be cut for firewood by the people free of charge in their own village areas, and may also be exported in the shape of head loads without payment and without permission. Firewood, if removed beyond village bounds in large quantities, is paid for at fixed rates. For wood required for building or other purposes the permission of the patel must be obtained, and payment made according to certain rates fixed for the whole province excepting the Melghát. The payments are the same whether the timber is used in the village or exported for sale. Mangoes and mohwa are sold by auction under the Survey and Settlement Rules; the right to collect them in one year being generally sold village by village. Chironji and bhilaun are free.

Grasing.

152. In the waste lands of the second class in which no grazing rights have been granted, the right of pasturing cattle and of cutting grass during one year is sold by auction.

Cultivation.

153. Regarding the breaking up of land for cultivation the following rules obtain: No land included in free grazing numbers is allowed on any account to be broken up for cultivation. In the case of waste lands it rests with the Deputy Commissioner to grant the occupancy of fields under the Survey and Settlement Rules. On land thus granted all trees of the 'unreserved' kinds may be cut and rooted up by the occupant. If the land contains any valuable trees of the 'reserved' kinds the Deputy Commissioner frequently requires the district forest subordinate to send in reports. The occupant can acquire proprietorship of the trees of the reserved kinds, either by purchase, or if of little value they may be granted to him by the Deputy Commissioner without payment. If the number of the reserved kinds on the field is small, the ryot often prefers to let them stand, with the view of acquiring proprietorship by a twenty years' occupancy. In other cases the trees are valued and put up to auction at an upset price.

District reserves.

154. All the waste lands, whether they belong to the first or second classes here mentioned, were formerly included in the term 'unreserved forest,' and will now be called 'protected forests.' It is obvious that the protected forests consist of numerous small blocks scattered all over the country. A commencement has been made in all districts to demarcate certain blocks of protected forest as district reserves. As a rule, they have been formed from the numbers of the second class in which no free grazing was granted at the time of settlement.

The progress made in this respect has been as follows :—

In the *Básim district* six such blocks have been demarcated in the Básim and Mangrúl taluks with an aggregate area of 17,000 acres.

155. On the 22nd of February we examined a block situated on both sides of the Borud nála which has been formed of a portion of the waste lands of the six villages—Kini, Raygaon, Chundas, Kolegaon bazurg, Kolegaon khurd, and Kharwadi. The area of this block is 2,996 acres, and the following statement explains the areas taken from each village :— **Raygaon district reserve.**

Statement of Land included within District Reserve near Raygaon, Básim District.

VILLAGE.	Total cultivated area.		Waste area allotted for free grazing by Revenue Survey.		Waste area in which grazing rights have not been allotted by Revenue Survey.		Total area of village.		Area included within district reserve.		Area included within State reserve (Ghátbori).	
	Acres.	Guntas.	Acres.	Guntas.	Acres.	Guntas.	Acres.	Guntas.	Acres.	Guntas.	Acres.	Guntas.
Kolegaon bazurg ...	1,223	37	212	...	604	38	2,040	35	522	36	...	..
Kini	1,867	5	428	17	221	38	2,517	20	142			
Raygaon	1,866	6	574	6	1,391	15	3,831	27	834	19	237	27
Kharwadi	985	3	80	36	574	36	1,640	35	524	17	...	...
Kolegaon khurd ...	890	26	162	7	826	18	1,879	11	768	36	..	...
Chundas	2,301	24	340	24	300	13	2,942	21	204		...	...
TOTAL ...	9,134	21	1,798	10	3,919	38	14,852	29	2,996	28	237	27

156. This block was demarcated two years ago, but the marks as yet are of a temporary nature, consisting chiefly of patches of red paint on trees. I was informed that a fire-path was ordered to be burnt all round this district reserve by the patels of the above-mentioned villages. **Demarcation.**

157. This block has been closed against all cutting of wood, and not even firewood is allowed to be taken out. **Cutting of wood prohibited.**

On the other hand it has been thrown open for grazing and the cutting of grass free of charge to the above-mentioned six villages, on the understanding that the villagers undertake to protect the block against fire, and that in case any fire should occur they will have to pay for their grazing at certain rates fixed by the Deputy Commissioner. **Grazing permitted.**

158. We examined the block throughout its entire length, commencing at the village of Kini and descending the chief valley to near the northern edge of the block, from whence we went across to Raygaon. The greater part of this district reserve examined by us has been grazed down so much that there is no grass whatever to burn, and only in the valley and on the slopes towards Raygaon is sufficient grass left on the ground to feed any jungle fire that might occur. **Inspection.** **Effect of too much grazing.**

However, I am informed that it is only recently, since the adjoining reserved forests of Ghátbori have been closed against grazing, that this part of the protected forest has been so much grazed down, and that formerly the grass was much higher.

Under existing circumstances it appears to me that the concession of free grazing in this large block is out of all proportion to any services which may be possibly rendered by the villagers in the matter of fire protection, and there seems to be no reason to suppose that the forest would burn if grazing was sold by auction, as was formerly the case. It seems to me a matter for consideration whether it is necessary to continue to grant free grazing in this block. The measure of forming these reserves has been most beneficial, for if this land had not been made into a district reserve it would doubtless, long ere this, have been broken up for cultivation, and in a country where the forest resources are so small as in South Berar it is a matter of importance to protect the few forests that remain.

159. On the plateau and on the slopes the forest is open, stunted, and very poor, but along the valley the growth is fair, and there is a considerable portion of well-grown tall teak poles. **Growth and reproduction.**

It is, however, out of the question to expect any reproduction in this forest as long as unrestricted grazing is allowed, and after the management of the

adjoining Ghátbori reserve has been placed upon a permanently satisfactory footing, those portions of this block which are situated in the valley and contain promising teak poles should be closed against grazing.

Area of district reserves in Basim district.

160. The aggregate area of the district reserves formed in the Básim district is 17,000 acres, which, with the State reserves of Kinwat, Penganga, and parts of Ghátbori, is about 4½ per cent. of the entire district, which is 2,958 square miles.

District reserves in Buldana.

161. In the *Buldána district* three blocks have been set apart as district reserves, *viz.* :—

First.—The Buldána block, comprising the edge of the gháts west of the station and situated half in the Chikhli, half in the Malkapur taluk, about 8 miles long with an area of about 13,000 acres. The rock is trap, and the forest consists of salsi, sáj, tendu, with a small mixture of teak, but very little anjan.

Second and third.—The Dhad and the Madi blocks, situated near the Nizam's boundary, south-east of the Lonar, the former measuring 1,168 and the latter 969 acres.

The grazing in these three blocks is leased under the Survey and Settlement Rules. The cutting of wood, even for firewood, is not allowed. Fires do not occur, as there is no grass to burn.

Lonar forests.

162. A block of forest which surrounds the Lonar lake, and which probably covers 1,000 acres, might with great advantage also be placed on the same footing. Immediately round the lake is a belt of babul varying in width and mixed on the outside here and there with sendhi (*Phœnix sylvestris*) trees. Between the babul belt and the deciduous forest which occupies the steep and rocky slopes of the crater-like basin are groups of tamarinds and mangoes. The forest on the rocky slopes consists chiefly of teak coppice which has been protected like all teak in the province for about the last ten years, mixed with *Sterculia urens* and a few other of the kinds of tree which are usually associated with teak. The aggregate area of the reserves formed, or proposed to be formed, is 16,137 acres, which, including the State reserves of Mattergaon part of Ghátbori, is about 4 per cent. of the Buldána district, which is 2,794 square miles.

District reserves in Wun.

163. In the *Wún district* the following blocks have been roughly demarcated, including the Kelapur reserve, in the Yeotmal taluk :—

First.—Yehlbar block. This is situated on the feeders of the Wagari river and occupies 23,000 acres, which are all waste and entirely at the disposal of Government.

Second.—Rin block, comprising nearly 16,000 acres and consisting entirely of waste areas.

In the Dariba taluk six blocks have been demarcated aggregating 38,000 acres, of which the most noteworthy is Pathrot, situated on the north bank of the Aran river on undulating ground, with deep and rich moist soil, and is well stocked with teak coppice. The forest is regarded as sacred by the people in the vicinity, who do not use the timber produced here.

It formerly contained numerous large trees, most of which were cut about ten years ago for railway sleepers. A few large unsound trees still remain.

The area of the waste land in this block is 2,881 acres. There seems no doubt that the value of this forest was at one time greatly under-rated, and no time should now be lost in demarcating and protecting it from fire.

On the Wún taluk there are eight blocks aggregating 22,000 acres. In the Kelapur taluk there are five blocks aggregating 42,000 acres.

Kelapur reserve.

164. Besides these district reserves there is the land demarcated as the Kelapur State forest, of which, however, on further inquiry, a portion only was found to be at the disposal of Government, part of the area being included in izarah villages. The lands belonging to these izarah villages are all waste, but the izardars claim the right to break up this ground for cultivation during the remainder of their lease, which has on an average twenty years still to run.

There are also two inhabited villages which are not izarah. It would not have been difficult to buy out the cultivated lands of these villages, but the izardars demand such high sums for compensation that it will probably be preferable to leave the greater number of them in possession and at present be

satisfied with demarcating two separate blocks, which will measure about 30,000 acres in the place of the area originally demarcated, which was much larger.

The claims of the seven izardars for the waste lands of nine villages now in their possession aggregate Rs. 60,000, and the forest is not sufficiently valuable to justify the payment of this amount.

The Kelapur reserve consists of plateaux, and valleys similar to the Kinwat forest. Teak grows on the slopes, bamboos in the ravines, the plateaux being principally covered with salei.

The rock is trap throughout.

The present value of this reserve, as well as of the blocks demarcated as district reserves in the Wún district, is very small.

The revenue hitherto realised has been insignificant. There is at present no demand for grass, but bamboos and teak will always find a local sale.

There is no chance of export by water down the Penganga, as forest produce has to compete in that direction with the much richer resources of the Chanda district. The chief line of export will be by land to the open country of the Wardha valley, and to the plains of the Amráoti district. Cultivation is, however, rapidly spreading in the Wún district, and it is a correct measure to reserve a certain proportion of forest. Including the two blocks of Kelapur reserve, as here proposed, the aggregate area of the reserve formed and proposed to be formed is 173,000 acres, which is about 7 per cent. of the total area of the Wún district, which is 3,835 square miles.

Protected forests in the Amraoti district.

165. The protected forests in the *Amráoti district* are of great importance, the average revenue yielded by them during the last four years being about Rs. 50,000. They are in charge of a forest ranger on Rs. 100 per mensem with a small establishment.

Forests of the Amraoti hills.

166. The most important blocks consist of about 50,000 acres situated in the Amráoti and Chandúr taluks in the hills to the east of the road from Amráoti to Badnera. Scattered over these hills are numerous grass preserves or 'ramnahs' with an aggregate area of 12,274 acres. On these the right of cutting grass and grazing cattle for 12 months is sold as in other waste lands by the tehsildar of the taluk, and these sales have realised from Rs. 6,000 to Rs. 8,500 annually.

Division into blocks for revenue purposes.

167. For purposes of cutting wood the whole of the hills is divided into five blocks, which are worked on rotation, one block being opened at a time. This system has been in force since 1866.

Revenue of the Amraoti hills forests, and privileges of villages in the removal of forest produce therefrom.

168. The amount realised from the sale of wood has been insignificant, between Rs. 400 and Rs. 1,000 annually. Here, as in other unreserved forests, villagers are permitted to remove firewood for their own use from the limits of their villages to any amount, and in head-loads it may also be exported free for sale. More important is the revenue realised by the sale of mangoes and 'mohwa,' which realised Rs. 1,700 in 1873-74, Rs. 1,400 in 1874-75, but only Rs. 220 in 1875-76 owing to the almost complete failure of the mango crop. The grazing of cattle in the portion of the hills outside the 'ramnahs' and not included in the free grazing numbers is managed in a manner different from other protected forests. The patels of villages apply for passes for the cattle of their villages and pay for them at certain rates; buffaloes, for instance, pay Rs. 12 per 100, pack-bullocks Rs. 7-8, cows Rs. 5. Plough bullocks, goats, and sheep are free.

Necessity for preserving a portion of the hills as forest, and the selection of the area to be preserved.

169. These hills are extremely bare, and, considering the requirements of the large town of Amráoti and the rich and open country around, it is desirable that a portion of them should be strictly preserved. It will not be easy to select a large area without inconvenience to the villagers, who have been in the habit of obtaining their firewood free and of grazing their cattle against payment. Moreover, the lands which are at the disposal of Government in these hills are exceedingly mixed up with the free grazing numbers, but it is believed that an area aggregating 10,000 acres can be obtained to be absolutely closed; so these should be demarcated and for a series of years be closed completely, until they have sufficiently improved to admit of their being worked on a regular system without impairing their productiveness. It will, however, be convenient, simultaneously with this measure, to place the whole of the hills, as far as it is intended to reserve them as forests and waste lands, under the Forest Department, and not to allow them to be broken up for cultivation;

otherwise the management of the closed blocks will become exceedingly difficult. As it is, the management of the waste lands of these hills is an exceedingly complicated business, there being three classes of lands: free grazing numbers, 'ramnahs' or grass preserves, and waste lands on which grazing dues are levied, all under a different system of management. If a fourth class of absolutely closed blocks is added, the complications will be greatly increased, and it is much better that all these lands should be in one hand. I have no doubt myself that, though a portion of the area is closed, the revenue from the remainder can, under careful management in detail, be increased considerably beyond what is realised at present. By effecting exchanges Mr. Drysdale thinks that he will be able to obtain control of an aggregate area of about 35,000 acres without any free grazing numbers in them. This area will not be in one block, but probably in three large blocks of an equal size and irregular shape.

The block furthest from Amraoti to be entirely closed

170. As already mentioned, a portion of this, estimated at 10,000 acres, can be closed and should remain absolutely closed, even the cutting of grass being prohibited until fire conservancy has been firmly established and the growth somewhat improved. The balance, which is estimated to comprise about 25,000 acres, it is also intended to protect against fire, but it will only be possible to exclude grazing from a portion. This will make the establishment of a system of rotation difficult and its success doubtful. Moreover, it is obviously necessary that the management of a large tract like the present, upon which numerous villages and the towns of Amráoti and Badnera depend for their supplies of wood and pasture, should be as simple as possible.

Grass preserves to be formed near Amraoti.

171. Under these circumstances I suggest that on the higher portion of the hills nearest Amráoti, one or a few large blocks be converted into permanent grass preserves or 'ramnahs' aggregating, say, 10,000 acres, and comprising the best of the existing 'ramnahs.' Besides the existing grass preserves, these blocks will include a large extent of broken ground and jungle land. This area would also be closed against the cutting of wood, but the grass on it would be cut and sold, as is usual in the 'ramnahs,' in November and December. This large extent of permanent grass land should, of course, be most carefully protected against fire and may be expected to improve considerably, while yielding a large revenue.

Remaining area to be left open for grazing. Control of fuel cutting.

172. The remaining 15,000 acres must, it is believed, be left open for grazing, but an attempt should be made to improve the pasture on this land by excluding cattle during the hot season,—that is, the months of March, April, and May. As, however, the whole of this area will be open to grazing during the remainder of the year, not much advantage is to be gained as regards the reproduction of the forest, by establishing a rotation of fuel cutting; and as the revenue from this source is small, it is doubtful whether it is advisable to establish a system of rotation for the better control of the revenue collections. If, however, on further consideration it should be found advisable to cut the fuel in this area or rotation, I would suggest the formation of three blocks only, each block being open for two consecutive years for cutting.

Three great sub-divisions thus formed

173. Under the arrangement here sketched the reserve will be divided into three great divisions, that nearest to Amráoti being treated as a large grass preserve, the grass being sold annually; while the one furthest distant from the station will be absolutely closed; and the central division will be open to grazing and the cutting of fuel. The sub-division of the reserve for protective purposes should be framed in accordance with these three great sub-divisions. In the closed block and in that open to the cutting of grass it will probably be possible on low and moist ground to establish plantations by sowing on the plot system in lines, as suggested in the chapters on the Melghát and the Kinwat reserves, with bér, palás, and salei on high ground. Considering that 1,000 poolas of grass, estimated to weigh 30 maunds, sell at Amráoti at an average rate of Rs. 10, these grass preserves ought to yield much more than an average rate of 8 annas per acre per annum.

Forests on the Karanja hills.

174. On the hills near Karanja in the Murtazapur taluk are two tracts occupying an area of nearly 10,000 acres, which have been closed since 1868. Firewood and fencing wood is cut by the villagers in their own areas without payment, but no wood may be cut for export. Grazing and the right of cutting grass is sold by auction, as in the other waste lands.

175. Besides these lands there are 552 babul buns in the 4 taluks of the Amráoti district, aggregating 11,500 acres. Some of these are included within free grazing numbers, and in the rest the right of grazing and cutting grass is sold by auction annually under the Survey and Settlement Rules. Of this area about 100 acres are cut annually. The wood is cut on account of the Department and sold at fixed rates on condition that it is cleared away within a year. No cattle are allowed to enter a babul forest after it has been cut. **Babul buns in the Amraoti district.**

176. In the *Ellichpur district* there are no protected forests outside those in the Melghát, except a number of babul buns in the plains: 315 of these, situated in 164 villages and aggregating 7,242 acres, are in the Ellichpur taluk, and 294 situated in 159 villages and aggregating 3,933 acres are in the Daryapur taluk. A large portion of these, however, are of insignificant extent. I had the privilege of consulting the Deputy Commissioner, Captain Mackenzie, on the subject, and ascertained from him that the interference of the district forest subordinates with these small areas covered with babul trees is harassing to the people, and that he is of opinion that Government control may be abandoned over many of the smaller buns, greater attention being paid to those of larger area. **Babul buns in the Ellichpur district.**

177. In the *Akola district* there are 408 babul buns aggregating 4,360 acres. Besides these there are protected forests in the hills aggregating 269 square miles. The two largest buns are those of Mattergaon on the north and Seoni on the south of the railway. Their area is 1,600 and 1,200 acres respectively. We visited the Mattergaon bun, which is situated on the Más nadi. It is on undulating soil with much kankar. The trees were cut over at the time of the construction of the railway about 15 years ago. The present growth is chiefly from coppice shoots. The trees are crooked and smaller than I should have expected to see them. Their average height is about 20 feet. The stems are short and irregular, generally 4 to 6 from one stock. When in full foliage, their cover must be complete. The lower branches are dry, and there is no trace of grass on the ground, but at the time of our visit the trees were nearly bare of foliage, all that there was consisting of young leaves. The old leaves had either been beaten down by rain or hail, or eaten by insects, very likely by the larvæ of the faggot beetle. The trees were full of the conical-shaped houses in which the pupæ are ensconced. We also examined in the Akola district a number of babul buns north of the Púrna valley situated on very undulating ground and evidently of exceedingly slow growth. **Babul buns in the Akola district.**

Here the babul was mixed with *Acacia eburnea* and *leucophlœa*, *Balanites*, and a few other trees. The forest, however, was open, the cover incomplete, and the height of the trees did not exceed 15 feet.

178. With regard to the babul buns in the Púrna valley, an inquiry in detail appears necessary so as to select those which may advantageously be placed under the Forest Department. As a rule, it will only be practicable to take charge of a few of the largest and of those which can be made free of grazing rights. The difficulty is, that portions of many of these babul forests have been set apart as free grazing numbers. Babul buns of smaller extent may also be taken charge of if conveniently situated for supervision. Fires never enter these forests, but cattle effectually prevent all reproduction: unless, therefore, grazing can be excluded, it is not worth while to take charge of any of these areas. **Selection of babul buns in the Purna valley for reservation.**

Statement A.

Receipts and Charges of the Forests in the Hyderabad Assigned Districts from 1874-75 to 1877-78.

No.	District.	Receipts.				Charges.				Surplus or Deficit.			
		1874-75.	1875-76.	1876-77.	1877-78.	1874-75.	1875-76.	1876-77.	1877-78.	1874-75.	1875-76.	1876-77.	1877-78.
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Direction ...	...	...	...	...	17,076	17,406	18,038	19,138	−17,076	−17,406	−18,038	−19,138
2	Melghát ...	86,037	80,576	1,17,188	1,24,269	30,225	28,865	47,268	55,865	55,812	51,711	69,920	68,404
3	Reserves, Básim and Buldána ...	2,388	3,506	2,153	2,848	13,615	17,428	16,053	18,666	−11,227	−13,922	−13,900	−15,818
4	Amráoti district ...	57,510	51,498	49,545	60,983	4,661	3,673	3,785	4,401	52,849	47,825	45,760	56,582
5	Ellichpur do. ...	4,478	2,574	4,105	5,380	18,979	18,033	1,048	1,029	−14,501	−15,459	3,057	4,351
6	Akola do. ...	29,197	26,819	22,063	23,009	2,132	1,746	1,495	1,428	27,065	25,073	20,568	21,581
7	Wún do. ...	39,195	27,718	27,919	31,834	2,138	1,637	3,975	6,532	37,057	26,081	23,944	25,302
8	Básim do. ...	25,008	20,363	10,065	12,803	1,534	1,270	1,963	1,852	23,474	19,093	8,102	10,951
9	Buldána do. ...	16,859	19,726	20,035	18,105	1,026	890	1,028	1,057	15,833	18,836	19,007	17,048
	Total ...	2,60,672	2,32,780	2,53,073	2,79,231	91,386	90,948	94,653	1,09,968	1,69,286	1,41,832	1,58,420	1,69,263

Statement B.

Forest Revenue of the Hyderabad Assigned Districts from 1871-72 to 1877-78.

Districts.	1871-72.	1872-73.	1873-74.	1874-75.	1875-76.	1876-77	1877-78.	Total.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Melghát	81,745	77,315	1,01,125	86,037	80,576	1,15,291	1,24,269	6,66,358
Ellichpur	2,803	32,644	3,091	4,478	2,574	6,002	5,380	56,972
Amráoti	36,729	58,097	49,495	57,510	51,498	49,545	60,983	3,63,857
Akola	2,687	37,897	29,633	29,197	26,819	22,063	23,009	1,71,305
Wún	18,311	32,631	49,382	39,195	27,718	27,919	32,337	2,27,493
Básim	10,158	10,808	13,076	27,396	23,869	12,218	13,448	1,10,973
Buldána	3,170	10,467	15,344	16,859	19,726	20,035	19,805	1,05,406
Total ...	1,55,603	2,59,859	2,61,146	2,60,672	2,32,780	2,53,073	2,79,231	17,02,364

Statement C.

Revenue and Expenditure of the Bairagarh Reserve (Melghát) for seven years, viz., *from 1871-72 to 1877-78.*

Years.	Revenue.				Total.	Total Expenditure.		Total.
	Timber I. 1. a.	Bamboos II. 2.	Cattle pound IV. 3.	Confiscated drift and waifwood I. 3.		A. Conservancy and Works.	B. Establishments.	
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1871-72 ...	12,291	.....	.....	.....	12,291	2,952	2,546	5,498
1872-73 ...	22,705	.....	.....	.....	22,705	6,522	7,288	13,810
1873-74 ...	17,749	3,406	.....	.....	21,155	5,983	8,417	14,400
1874-75 ...	7,332	4,837	12	15	12,196	9,311	9,004	18,315
1875-76 ...	7,683	1,349	14	93	9,139	6,996	9,280	16,276
1876-77 ...	2,136	1,714	174	.....	4,024	5,644	10,645	16,289
1877-78 ...	161	1,335	3	321	1,820	6,476	11,288	17,764
Total ...	70,057	12,641	203	429	83,330	43,884	58,468	1,02,352
Deduct expenditure					1,02,352			
Deficit					19,022			

Statement D.

Revenue of the Melghát Forests for twelve years from 1866-67 to 1877-78.

Produce.	1866-67.	1867-68.	1868-69.	1869-70.	1870-71.	1871-72.	1872-73.	1873-74.	1874-75.	1875-76.	1876-77.	1877-78.	Total.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Teak	...	...	...	...	...	...	11,551	27,340	25,629	16,440	58,245	70,939	2,10,144
Other woods	...	...	...	...	...	...	8,262	25,917	18,573	18,565	16,598	12,378	1,00,293
Bamboos	...	...	...	...	...	...	1,997	9,672	13 961	14,476	18,275	17,145	76,603
Bamboo tatties	...	...	...	...	...	...	95	318	303	258	103		
Firewood	...	...	...	...	...	...	11,515	4,245	4,449	5,777	4,860	4,136	34,982
Charcoal	...	...	...	...	...	...	1,742	2,293	2,639	3,190	2,132	1,787	13,783
Lime	...	...	...	...	...	...	32	391	43	48	30	51	595
Grass	...	...	...	...	...	...	4,331	3,804	2,184	2,771	2,246	1,134	16,470
Grazing dues	17,874	14,040	2,802	7,847	6,510	6,544	3,350	5,014	5,574	7,240	6,819	9,298	92,912
Teak leaves	...	...	...	...	...	...	267	584	477	593	587	380	2,888
Lac	...	...	...	...	...	...	403	499	434	235	215	161	1,947
Roots and fruits	...	...	...	...	...	...	63	1,782	4,107	2,830	2,879	3,785	15,446
Gum	...	...	...	...	...	...	159	44	82	64	29	28	406
Miscellaneous	...	...	...	...	...	...	935	1,470	246	404	94	149	3,298
Naka revenue *	32,000	55,637	70,056	93,845	1,07,247	58,937	...	...	...	...	...	...	4,17,722
Total ...	49,874	69,677	72,858	1,01,692	1,13,757	65,481	44,702	83,373	78,701	72,891	1,13,112	1,21,371	9,87,489
Revenue from the Bairagarh Reserve	...	...	..	...	...	12,291	22,705	21,155	12,196	9,139	4,024	1,820	83,330
GRAND TOTAL ...	49,874	69,677	72,858	1,01,692	1,13,757	77,772	67,407	1,04,528	90,897	82,030	1,17,136	1,23,191	10,70,819

* The details of the naka revenue are not available for the years from 1866-67 to 1871-72.

Statement E.

Revenue realised from the Melghát unreserved Forests at the different Nakas or Revenue Stations.

No.	Names of Stations.	Naka Realisations. 1874-75. Amount.	1875-76. Amount.	1876-77. Amount.
		Rs.	Rs.	Rs.
1	Bahram	6,644	4,309	8,353
2	Karpi	417	599	250
3	Malhara	4,308	4,735	5,184
4	Dhámangaon	12,299	8,869	15,066
5	Deogaon	1,055	1,731	961
6	Borala	849	1,160	684
7	Wagholi	1,722	793	346
8	Wagdeo	3,360	4,426	7,341
9	Chinchona	1,346	1,347	2,107
10	Ambari	6,381	5,713	7,643
11	Kasod	12,450	12,387	20,703
12	Kirkera	897	736	1,028
13	Jiri	12,951	13,680	23,372
14	Kamod	2,387	2,319	4,610
15	Wasali	585	724	3,341
16	Kalamkar	5,476	2,123	5,334
	Total ...	73,127	65,651	1,06,299
	Grazing dues ...	5,574	7,240	6,819
	Total ...	78,701	72,891	1,13,112

Statement F.

Total number of Teak Trees cut in the Bairagarh Reserve south of the Sipna River, from 1871-72 to 1876-77.

Years.	Trees.	Pieces of sound wood obtained. Nauts.	Pair nauts.	Small pieces.	Total pieces.	Total amount realised.
						Rs.
1871-72	30,000	745	946	30,680	32,371	12,291
1872-73	18,000	262	1,262	44,806	46,330	22 705
1873-74	15,000	275	1,729	44,984	46,988	17,749
1874-75	30,000	102	641	17,036	17,779	7,332
1875-76	12,000	170	493	17,957	18,620	7,683
1876-77	2,000	7	18	3,961	3,986	2,136
Total ...	107,000	1,561	5,089	159,424	166,074	69,896

Government Central Press—No. 207 R., A., & C.—9-1-79—350.